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## ORIGINAL ARTICLES

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### PRESIDENT'S ADDRESS\*

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THE AMERICAN SOCIETY OF ORTHODONTISTS

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CHARLES R. BAKER, D.D.S., F.A.C.D., EVANSTON, ILL.

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IT IS with sincere appreciation of the high honor you have conferred upon me that I address you as the presiding officer of this splendid organization, the objects of which are so altruistic and commendable. We are united in earnest endeavors to attain more knowledge concerning growth and development and to improve our methods of technic and operation in the prevention and correction of abnormal function associated with human deformities. This society, which was founded more than thirty years ago by a very small group of earnest men who were interested in establishing orthodontia as a distinct specialty and by association improving themselves as orthodontists, now has about four hundred members.

Orthodontia has developed rapidly in recent years, and malocclusion of the teeth is now generally considered an important health factor. This rapid progress may be responsible, in a degree, for some of our present day problems, a few of which I shall discuss briefly.

#### ORTHODONTIC EDUCATION

The problem of how much should be taught in orthodontics in the dental schools and whether such instruction should be confined to a study of the orthodontic problem, which would naturally include embryology, development, normal occlusion, etiology, prevention and interception of abnormal development of the dental arches or whether it should also include corrective treatment of malocclusion, is too comprehensive to be considered at this time.

When we realize that in some dental schools only 3 per cent of the entire teaching time is devoted to teaching orthodontics, it would seem that the subject is not appraised at its actual value in comparison with other courses of instruction.

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\*Read at the Thirty-First Annual Meeting of the American Society of Orthodontists, Toronto, Canada, May 17 to 20, 1932.

Some dental schools allow students to graduate even though they have failed to pass an examination in orthodontics successfully. Certain state boards of dental examiners issue licenses sanctioning the practice of dentistry, including orthodontia, to men who fail in their examination in orthodontics.

Such procedures are responsible for a very unfortunate situation. There may be many dentists who failed in orthodontics both in the dental school and in the state board examination, who are legally licensed to practice orthodontia although they are not qualified to do so. This logically suggests that the public welfare is not properly safeguarded. The problems of orthodontic education and dental legislation are closely related.

I should like to suggest that during the coming year, the committees on Orthodontic Education and on Legislation make a thorough and comprehensive survey, of these problems in their respective fields, and if possible be prepared to report at our next meeting with constructive suggestions for the improvement of existing conditions. A survey of this nature would seem logically to include a consideration of: undergraduate study, graduate study, state board examination and state dental laws.

#### DENTAL LABORATORIES

The influence of advertisements of dental laboratories which state that they will diagnose a case of malocclusion, make the necessary appliances and furnish instructions and advice that will insure successful treatment, would be a source of humor to the orthodontist if he did not realize that many dentists believe them and take advantage of these opportunities to engage in an attempt to practice orthodontia. There can be no objection to a laboratory making appliances, although I do not believe many orthodontists use laboratory made appliances. It is a serious matter, however, when a laboratory mechanic attempts to diagnose cases and offers advice regarding orthodontic treatment.

It seems impossible to influence the dental journals to refuse such advertisements. This problem appears to be one of educating the dentist, and this of course should begin in the dental school.

#### AMERICAN BOARD OF ORTHODONTIA

The American Board of Orthodontia is a judicial body created and operating for the purpose of raising the standard of the practice of orthodontia. It is most encouraging to learn that a large number of orthodontists have applied for the privilege of being examined by the Board for certification. An editorial by our fellow member, Dr. H. C. Pollock, which appeared in the *INTERNATIONAL JOURNAL OF ORTHODONTIA, ORAL SURGERY AND RADIOGRAPHY* (March, 1932) states: "It is the aim of the Board, when a weakness of the applicant in orthodontia is discovered, to make helpful suggestions in order that he may improve his service to the public. Therefore, in some instances in which applicants have written and given satisfactory clinics before societies upon the technical aspects of orthodontia, but not upon the biologic phases, they have been examined more particularly in the latter. In other instances, when an applicant through technic, theses, and case



reports submitted to the Board has proved his ability to treat orthodontia cases successfully, but a visit to his office by Board members revealed that the general appearance was below the average a professional man should maintain, or when lack of interest in the local orthodontia society was noted, it was suggested that these faults be remedied, when the Board would reconsider the application."

"The work of such a Board entails much responsibility. All of the members feel this responsibility, for they give each case thorough consideration, with a sincere desire to be just to each applicant, and at the same time with a kindly effort to show those who fall short of the requirements their weak points and make suggestions for their correction."

Dr. Pollock also states: "The American Board of Orthodontia has been organized, conceived, and developed with no other motive in view than that it might be able to segregate members of the orthodontic profession who are approved in so far as their ability is concerned; accordingly, the Board should receive the whole-hearted and enthusiastic support of orthodontists everywhere. It is a step forward and a move in advance for the future."

The duties of the Board are necessarily very arduous; its members are to be commended heartily for their earnest and untiring efforts in attempting to serve applicants in a fair and impartial manner. The men who successfully comply with the requirements of the Board and receive a certificate are worthy of congratulation. I earnestly recommend that our members apply to the American Board of Orthodontia for certification.

#### RESEARCH

It is very gratifying to learn of the numerous individuals and groups of men who are actively engaged in the field of research whose findings may be of vital importance in the practice of orthodontia. The American Society of Orthodontists should continue its genuine interest in all such serious endeavors, whether they are biologic or mechanical in nature, and should cheerfully sponsor them, contributing financially when necessary and if possible to all such projects in which the results may seem to be of practical value to the individual orthodontist.

#### STUDY CLUBS AND POSTGRADUATE COURSES

It is also encouraging to learn that many orthodontists, particularly the younger men, are availing themselves of the opportunities afforded by study clubs and by the short postgraduate courses of instruction which are being given in different sections of the country.

One of our members recently proposed a plan of arranging a short course of instruction featuring some phase of orthodontics to be held immediately preceding or following our annual meeting. I believe that this idea has genuine merit, and I should like to suggest that it be considered in time for operation at the next meeting if our members desire such an innovation.

The Chicago Centennial Dental Congress will be held in Chicago during the second week of August, 1933, and present indications are that this will be the greatest dental meeting ever held. There will be an extensive exhibit in the Cen-

tury of Progress Exposition, (World's Fair) in Chicago in 1933, which will outline and demonstrate the development of the dental profession during the last one hundred years. The World's Fair will open June 1.

At this time I want to express to my fellow officers and also to the membership my sincere thanks for and my appreciation of their generous support and cooperation. The entire credit for the splendid program which has been prepared belongs to the Board of Censors, and I want especially to thank Dr. James D. McCoy for his untiring efforts and for his whole-hearted enthusiasm over a long period of months. Our secretary-treasurer, Dr. Claude R. Wood, has had a very busy year, and I want to express my deep appreciation for the capable manner in which he carried out his duties and for his courtesy and cooperation at all times.

Our Canadian members who have made all of the local arrangements for this meeting deserve a world of credit. I believe they have anticipated everything that we may possibly want and have made suitable provisions for them. They have arranged for a series of radio broadcasts, which should be of value to orthodontia, and they are providing speakers for our luncheons. The wives of these men have graciously arranged entertainment for the visiting ladies. In behalf of the members from the United States, I want to express our genuine appreciation to the Local Arrangements Committee and also to their wives.

It is a pleasant privilege to meet this year with our Canadian friends and my earnest wish is that when each member and guest departs he will experience a feeling of satisfaction and profit.

## PRESIDENT'S ADDRESS\*

SOUTHERN SOCIETY OF ORTHODONTISTS

CLAUDE R. WOOD, D.D.S., KNOXVILLE, TENN.

IT IS my very pleasant duty to address you as president of the Southern Society of Orthodontists at this, the twelfth annual meeting. I deeply appreciate the honor you have bestowed upon me, and it is with a feeling of pride and joy that I appear before you, but I am ever mindful of the responsibilities that the office carries with it, and the vote of confidence that you placed in me when you elected me to this position.

It is with deep sorrow that we record the passing of one of our honorary members, Dr. William C. Fisher. He became ill attending the Second Orthodontic Congress in London, an illness from which he never fully recovered. He passed away on October 15 at his home in New York City and was buried in the National Cemetery at Arlington, Virginia.

He helped perfect the organization of this Society and was in constant attendance for many years. He was also the organizer and first president of the First International Orthodontic Congress. The result of his labors will be long remembered, as he carved for himself a place in the orthodontic and dental professions.

He did much in the organization of the Dental Corps of the United States Army and served throughout the World War with the rank of major. Since the war he had attained the rank of colonel which he held in the Reserve Corps at the time of his death.

Ordinarily the president has certain recommendations that he presents for consideration before the Society, either changing of the old order of things or the addition of certain new ideas. However, during this chaotic time I think it well if we can continue under the present order without making any changes.

I should like to leave a few thoughts with you. As one's memory wanders back to the earlier years, the first question likely to present itself is, what influence created one's desire to go into the field of orthodontia? The particular impulse or deciding factor in the life of each of us has probably been different. I wonder, however, whether many of us, especially the younger men, cannot look back upon pleasant contact with some fine character in the profession whose influence largely molded our decision.

It has always been a source of great pleasure to me to have lived early enough to have been intimately acquainted with many of the group of early pioneers in orthodontia, and as the years pass by I know that this memory will linger on and grow more dear to me. It is to this group of pioneers that we owe much. They were confronted with many responsibilities, but they cleared the way, blazed the

\*Meeting held October 31, 1932.

trail, and broke down that quiet criticism which was prevalent at that time and which still exists to a certain extent.

As individuals and a society we must give our thanks and appreciation to these pioneers of orthodontia. It was this group of men who are responsible for the organized orthodontic societies of today and made it possible for this organization to evolve in a most orderly manner. It is a great pleasure to have with us, I believe, every charter member and most of the past presidents of our own, the Southern Society.

We must not forget that the men who left us our heritage were patient observers; they were willing to repeat their observations, to recheck their conclusions, and to correlate those conclusions with the result of previous researches.

Isaac Newton wrote: "I know not what the world will think of my labor, but to myself it seems that I have been but as a child playing on the seashore; ever finding some prettier pebble, or more beautiful shell than my companions, while the unbounded ocean of truth lay undiscovered before me." Newton did not close the door to investigating minds to come. He saw far beyond his own environment. Here is an important landmark that should serve a great purpose. How can men be intolerant or dogmatic? The greatest prerequisite of progress is an open mind; fixed opinions retard the waters of clear flowing knowledge.

Disraeli said, "The Romans were practical men who practiced the errors of their forefathers."

Ruskin said, "There is only one way of seeing things rightly and that is seeing the whole." It may be summed up in the words, "Look to the end."

In the light of human understanding, scientific truth is not fixed; the doctrines of today must be modified or discarded as the result of tomorrow's experience.

With every advance of knowledge, new vistas of the unknown open themselves before us. The problems become more intricate; they deal with the fundamental processes of nutrition and repair; with the reactions of tissues, cells and protoplasm to the many substances from without and from within the organism that act on them. Investigations require the aid of the general physiologists and pathologists, and of biochemists in cooperation with clinical evidence.

We hear much about the "mechanical age." Do not allow yourself to drift into a machine age or mechanical frame of mind. It must be borne in mind that instrument is only an aid to observation; observation is useful only when it passes through the mill of careful thought and reflection. Instruments enable us to see; they can neither observe nor think for us.

With so much yet to be discovered, why take our present status so seriously? Our traditions are not in danger, but our interest in the problems of the day requires the direction of the combined wisdom of our leaders. For those in orthodontia who feel the urge, there is food for both mind and soul. Human need is the great incentive. Impelled as we are by high purposes, this underlying motive binds us to the living.

Dentistry needs its men, the lowest to the highest. Let no man hide back of his ego and critically deride the profession, but let him become an interested worker. If he has talent or ideas, let him assume leadership. He is always welcome.



There has always been much talk concerning the value of experience. Orthodontic experience does not consist solely in doing the same thing many times or in seeing a great number of patients. For one may see without perceiving, and one may observe with a mind that does not understand. Experience represents the result of thoughtful reflection, observation and drawing of valid conclusions by the method of deduction. Such experience is accumulated by the purposeful coordination of one's own observations and by proper consideration of the work of others. A good orthodontist is one who can apply in diagnosis and treatment of the individual case the knowledge and wisdom that he has acquired, and who can foretell with a reasonable degree of accuracy the outcome. We are bound to the constant endeavor of doing the best we can whether upon a perfect or upon an imperfect knowledge.

Too often research and experimental work are carried on exclusively in laboratories or in isolated places. The best type of research may often be done by thoughtful, studious orthodontists in their everyday work.

We all realize, I believe, that the science of orthodontia can and will progress by the study of the basic problems which relate to growth. To this end this program is dedicated. We have with us essayists who have given much thought and consideration to the study of this problem, and I speak of W. W. Woodbury of Halifax, B. Holly Broadbent of Cleveland, Milo Hellman of New York City, Hugh K. Hatfield of Boston, and A. LeRoy Johnson of New York. We owe these men our deepest thanks for coming to this meeting. All have traveled quite a distance to be with us, and I know I speak for the membership when I say we welcome you with open arms. We hope the Southern Society will become the meeting place of the open-minded men of orthodontia and serve as a bivouac for the free thinking and for a free discussion of the problems that confront us. Not that we would antagonize or encroach upon the American Society, but I believe that the Southern Society has a useful place and can serve a useful purpose in the orthodontic societies of this country.

We have also an arrangement of outstanding discussions, case reports and individual clinics, some of which were contributed by members of the profession outside of our own society. To these men we owe our sincere thanks. They were the result of a single invitation without any kind of remuneration; that is the spirit of the true orthodontist. The profession will always advance if it has men of this type.

I wish to thank our own members for their most liberal support in contributing to the program; every one responded most generously when called upon.

For the arrangement of this program I wish to give the entire credit to the Program Committee, consisting of Clinton C. Howard and W. A. Clarke of Atlanta, and W. P. Caine of Chattanooga. They have given much of their time and labor to the arrangement of this meeting.

I wish also to thank our secretary, George M. Anderson, for his cooperation and the way in which he has handled the duties of his office during the past year.

I am very happy to welcome our guests and friends who have come to attend this meeting, many of whom have traveled quite a distance. We are glad that you are here. We hope that you will enter freely into the discussion of these

papers and that when the meeting is over you will feel that your trip has been worth while, and that you have derived benefit from it.

To the members of the Society, I say that I consider your coming here the greatest honor you could have shown me. You bestowed the honor of President upon me a year ago, but now by your presence you make it the happiest moment of my life, and it will be a lasting memory in the years to come. I have tried to do my duty the best I knew how and to carry on the work in the past year so that it would do honor to your highest office, and I pledge myself to carry on in the years to follow. I am proud of our Society and its heritage. From the original nine charter members it has grown to an active membership of eighty. It stretches from Baltimore on the North to the Gulf on the South and from the Atlantic Ocean on the East past the Mississippi to the west—may it continue to grow and prosper. It is an honor to belong to this Society and I hope that each of you will so conduct yourself and practice that it will bring honor to you and to our own, the Southern Society.

TO WHAT DEFINITE CAUSES MAY MALOCCLUSION AND ITS  
ATTENDING ORAL AND FACIAL ABNORMALITIES  
BE ATTRIBUTED?\*

ALBERT W. CROSBY, D.D.S., NEW HAVEN, CONN.

FOR many years, more than a quarter century, I have been interested in the etiology of malocclusion. I believe that my chart, presented to the Angle School Alumni in 1906 and published in the second number of the *American Orthodontist*, was the first comprehensive chart ever presented before an orthodontic society containing the etiologic factors in malocclusion of the teeth known at that time. Others may have been and probably were used prior to this published chart. This fact is not cited in a bragging spirit but rather in the same spirit as the saying of the Yolloff's "He who is born first has the greatest number of old clothes."

I might take as my theme "Our Changing Ideas." We have made some "about faces" in the third of a century in which orthodontia has been a science. Our medical brothers have, too, as in their ideas in the treatment of fever. For example, you remember the old slogan "Feed a cold and starve a fever." This has been replaced by the saner and more modern idea of furnishing extra nourishment to meet the greater calory needs during a run of fever.

We also have made as complete a turn about when, in the light of the experiments of Oppenheim, Gottlieb, our own Marshall and others, we realize that a physiologic bone change which is unaccompanied by inflammation and soreness can be accomplished very nicely and the result be more permanent than in the day when we used heavy clumsy appliances, giving all the pressure a patient could stand without actually ruining his health.

Let me quote from the report which John Marshall will give at this meeting, what Gottlieb says about what happens when great stress is used. It will not hurt you to hear it twice and you will probably get more out of it by reiteration.

"When the pressure is severe enough to force the root of the tooth into contact with the bone, the peridontal membrane, at the point of contact is destroyed. No resorption of tooth root or of bone occurs at the point of contact. Instead another process sets in by means of which the small area of bone in contact with the tooth is undermined. It is eventually isolated and resorptive processes encircle this small particle of bone. This is another proof of the severity of the pressure."

I heard a fine and illuminating lecture Dr. Charles R. Stockard gave in February at the Yale University School of Medicine and I shall quote liberally some of the things he says in his book *The Physical Basis of Personality*, published in 1931.

"Physicians, like most people, are inclined to think of the existence of the individual as extending from birth to death; that is, only the period of visible life

\*Section of symposium presented at the Thirty-First Annual Meeting of the American Society of Orthodontists, Toronto, Canada, May 18 to 20, 1932.

and common acquaintance from birthday to death-day of the ordinary man and further, within this span, childhood is often thought of as a least important period.

"History is written on such a basis, the dates of birth and death are the limiting marks. But the heroes of history were biologically superior individuals long before they were born or named. The biologist very well knows that the most important part of individual existence for man is passed and over *before* birth.

"The chief events, probably more than 95 per cent of the entire development, and the dangerous steps when any mishap may cause organic deformity and future malexistence are passed before birth."

He gives a graphic illustration when he says, "The single cell ovum of microscopic size undergoes an enormous evolution in producing the seven pound infant composed of millions of cells, while a comparatively small change is yet to take place in increasing the body into *the* only twenty times heavier adult man."

In conclusion he says, "There is no question here of the degree of importance between the genetic background and the developmental environment; neither is sufficient without the other. Without genetic basis there is no individual, and without a suitably arranged complexity of environment the complete genetic basis is unable to produce the normal individual. The interaction between the individual and the environment is continuous from the germinal beginning to the end of life, and it is mutual: Each modifies the other. The individual and the environment are not separate; they are parts of a larger arrangement.

"It is often difficult to say what we actually have or have not inherited. We simply see characters which have been able to express themselves out of the fundamental genetic basis with which we started. Individual constitutions are truly a combination of inheritance and development, and the possibilities of neither are expressed to their fullest extent.

"Development after birth, like embryonic development is, therefore, not merely a growth or increase in size but still an epigenetic process, each stage to come depending upon the perfection and quality of the preceding stage. No step can be omitted or misplaced without producing an effect on all subsequent processes of maturation. This progression is largely accomplished through a continuous elaboration of new internal products which tend to direct and insure the nature of the final individual."

#### THE ORIGIN OF SUPERNUMERARY TEETH

Stockard found in his experiments on fish eggs that he could induce fish eggs to form double monsters and twin embryos by simply interrupting the early progress of development. He found this interruption could be brought about either by unusually low temperature or by other methods of slowing the developmental rate, such as reducing the supply of oxygen. Dr. Marie Hinrichs secured similar double conditions from treatment with ultraviolet rays. Such treatments also inhibit and arrest the normal rate of development.

It may be correctly claimed, on the basis of such recent experiments, that any environmental condition which arrests the progress of development at a certain critical stage will tend to give rise to accessory budding and double embryo formation.

"The wide significance of arrest during development was appreciated by the



French teratologist, Dareste, more than forty years ago from his studies on structural deformities. But the experimental proof of the effects from arrest has only been obtained during recent years. Deductions are valuable, but experimental confirmations are invaluable, and no one need confuse the two." In supernumerary teeth we see a potential power of budding in the human.

Such secondary or accessory buds seldom have the same perfection of form and are seldom quite as large as those developed from the primary bud.

"The slow rate of development due to unfavorable environmental conditions upsets the usual supremacy of what should be a rapidly growing part, and lessens its inhibiting influence over other parts; thus some of these parts are enabled to express themselves ahead of their usual time. The doubling of parts is being more and more recognized as a common phenomena. Not only is the occurrence of twins and double embryos in the single egg of high significance from the standpoint of developmental constitution, but the further development of these double specimens furnishes most instructive material for an understanding of the effects of developmental competition in the origin, growth, and progressive differentiation of the various organs of the animal body."

Stockard and Todd have both called to our attention that a step in development may be skipped entirely, and this is probably the explanation of another phenomena, missing teeth.

"Of course, all organs of the embryo are not formed at the same time; some, such as the neural tube, the optic vesicle, the heart, et cetera, arise during the very early stages; others, such as the liver, kidneys, and skeletal parts, during the intermediate stages; and still other structures, such as pigmentation and hair, appear very late in development. The moment of origin seems, judging from experimental results, to be a most critically susceptible time in its development. At this stage we may imagine the organ to be in the same condition as a bud when immediately producing a shoot. The fundament of the organ, its so-called *Anlage* or potential basis, consists of only a limited number of cells which are initially in a rapid state of multiplication in order to build up a mass of the organ as it grows forth to express itself. An interruption in this building reaction is more severely detrimental to the future organ than an injury at any later moment would be. After an organ has arisen successfully from the *Anlage*, it may be lamed or runted, but its nature and actual existence can no longer be destroyed by interrupting its growth."

Stockard explains differences in the bilateral halves of the body in these words. "There is in general a slight discrepancy in size and vigor between the bilateral halves of a vertebrate embryo. If one examines minutely in either an amphibian or a bird embryo the early neural plate stage, that is, the stage when the embryonic central nervous system is an unfolded flat region of cells—it will occasionally be noticeable that one side of the neural plate is somewhat ahead of the other in size and development.

"Although these differences between the two sides and the members of organ pairs are usually so insignificant as to escape general notice, they are, nevertheless, sufficiently important to give rise to very puzzling conditions in our experimental studies of development."

Asymmetries in the face are frequent, and probably not all of them can be ascribed to lack of function on a particular side but to some more favorable growth

urge on the favored side. Judging from the pictures we see in the newspapers and magazines there is great asymmetry in the development of the faces of many who excel in ability and among those occupying high stations in life.

There are some cases or types of cases with an etiology that warns us we should not attempt to treat them, for example, the type of malocclusion associated with acromegaly. This, when marked, is readily recognized, but the difficulty is that this growth is not apparent until after the growing period is practically over. At this stage we recognize the lack of development in the maxillary bones and the overdevelopment, in every dimension, of the mandible, as well as enlargement of the hands and feet, overhanging eyebrow ridges, etc. These can usually be easily distinguished from other varieties in which the deformity is largely local and which are amenable to treatment. Impacted and difficult erupting third molars and hypertrophied tonsils we also recognize as being susceptible to treatment.

I have even seen a case in which a small boy's imitation of a dearly loved grandfather who had a pronounced protrusion of the mandible caused a similar condition in the child's mouth. He would sit on a stool watching the grandfather for long periods and unconsciously imitating him by protruding his own little jaw. The condition got so bad by the time he was five and a half years old that it was deemed desirable to treat the case. Too long retention of the deciduous incisors with the eruption of all the maxillary permanent incisors in lingual occlusion gives every outward appearance of a Class III case and may even develop into one.

There are borderline cases where, as Sir Arthur Keith expresses it, there is an "acromegalic taint" which can be controlled by treatment. We have all seen just that thing happen. These cases when treated early seem to have a restraining influence on the anterior pituitary.

Another type that is beyond our power to benefit with our present knowledge is the achondroplastic individual. What are the landmarks of achondroplasia? First we notice the dish-shaped face with the hydrocephalic cranium and the overhanging brow. The under part of the cranium presents an interesting picture; all the bones seem to have been shortened a little, the sphenoidal process of the occipital bone in front of the foramen magnum, the bodies of the sphenoid and ethmoid, while the vomer is flattened and spread, the nose broad and flattened, and the triangular cartilage of the nose would never be recognized by its name.

Another baffling type was cited in a letter you all received from Dr. Ketcham in connection with the research work in which this Society is interested under the direction of Dr. John A. Marshall which contained this admonition. "There is no need, I am sure, to urge you to study the report carefully. It shows so clearly the great responsibility of the orthodontist; the hazard of treating poorly nourished children on an unbalanced diet."

There are two kinds of cases we may discuss with no definite line of demarcation, perhaps, because after all, except for what may be called bad dentistry, much of it has a somatic origin, as in the incidence of caries; even pernicious habits, especially those which have begun early and persisted for a number of years during that period when the bones are most plastic. Some people's bones are particularly susceptible to deformation from pressure, while in other individuals they seem to suffer little deformation under apparently the same conditions.

It is my belief that habits should be treated as a nervous symptom of something

radically wrong, that the time is at hand when the pediatricist should be expected to discover the etiology and assist us in setting matters right. The trouble is that most physicians, as well as parents, do not consider the patient ill if he can attend school with some regularity, and pass his grades. Here is a field with a no man's land as yet largely unexplored.

Probably 60 per cent or more of the cases that come into our hands are complicated by poor dentistry, lack of knowledge of the value of early prophylactic care and filling of the deciduous teeth while the cavities are small, the judicious polishing out of decalcified spots, the application of silver nitrate when indicated, etc. The situation relative to children's dentistry is almost as bad as the situation was in D. D. Smith's time relative to prophylaxis, but just as soon as parents do appreciate that this service is invaluable to the health and development of their children, they will probably pay as gracefully and cheerfully as they now do for prophylaxis, thanks to the pioneer and educational work done by A. C. Fones.

We are certainly lagging behind in our duty to our clientele if we do not stress the importance of this. The American Dental Association is sponsoring an educational advertising program to enlighten the public, and there is a wonderful opportunity for our own Educational Committee to cooperate.

It is interesting to pause long enough to take note of a few of the men who have made history for us and to whom many of us have had an opportunity to listen.

Up to the last quarter of the nineteenth century this country had no research workers, and there were no facilities for their work, yet a few of us were welcomed to Philadelphia by that grand old man, S. Weir Mitchell, who was one of the staunch workers for the establishment of research in this country.

Quite a little was known about endocrines at that time, but no one knew how they got the message that they were needed in a certain locality until Bayliss and Starling discovered that the blood stream was the channel through which the communication was carried, and these intangible bodies, circulating in the blood stream, were called hormones or messengers by them. Two or three years later I heard Bayliss deliver a lecture at Yale giving the results of their further investigations.

Last summer Sir Arthur Keith lectured to us at the Royal College of Surgeons of England during the International Orthodontic Congress in London. He it was who first made me realize the great influence of these glands of internal secretion on growth and body metabolism and that we were probably wrong in thinking that local conditions were the important factors in malocclusion. When he was president of the British Society for the Advancement of Science he gave a paper on "The Demarcation of Mankind Into Racial Types." In it he discussed the discovery of hormones and told how the several glands of internal secretion worked to bring about such different racial types as the Mongol, the Black and the Caucasian, with such varying characteristics as cast of features, length of limb, body, etc.

Calories for measuring the energizing properties of foods were discovered about three years before the opening of this century.

Vitamins were brought to our attention through the work of such men as Osborne and Mendel, McCollum and Park. These men have all appeared before some of our societies.

Dr. Stallard in an article published in the *Journal of the American Medical*

*Association*, December 18, 1926, called attention to the relation the maxillary bones bear to the rest of the face. He reminded us that "The maxillae forming parts of the oral, nasal and orbital cavities, constitute a large part of the face. They articulate with all the other bones of the face, except the mandible, with the frontal ethmoid and occasionally with either or both the orbital surface and the lateral pterygoid plates of the sphenoid."

Oppenheim in an article published in 1911 was the first to attempt to show in his experiments on the monkey what happens to bone when various degrees of pressure and speeds of treatment were used.

There have been striking reports in the last half dozen years on growth and development of the facial bones.

Johnson, earlier this month, gave a preliminary report in which he described the work he is doing at the Cornell Experimental Morphological Farm under the direction of Prof. Charles R. Stockard.

Hellman has shown us in a number of articles, the last one read this month before the Eastern Association of Graduates of the Angle School of Orthodontia, how the face develops in certain abnormal as well as normal ways.

Todd has shown us beautifully that the face has four periods of vertical growth and three of horizontal with intervals of rather negligible amounts of growth between.

The Brash lectures before the British Society for the Study of Orthodontics in 1928 showed in his madder fed pigs that bone grew in different areas in the same bones at different stages in their development.

Howard has shown from his records at the Good Samaritan Hospital in Atlanta what influence the endocrines have on body growth and development, that chronologic growth and actual growth do not always syncronize and that a knowledge of facial length is indispensable in diagnosing infra- and supraclulsion.

Lewis has reported on the work he is supervising at the Merrill Palmer Institute at Detroit on growth and development as it takes place over a considerable period of years without any treatment.

Other investigations are being conducted at Yale, the University of Rochester, New York University and a new one is just starting at the University of Colorado. It is impossible to enumerate all of them, but many things of interest have already been demonstrated which have modified our ideas of what is of etiologic interest to us as orthodontists.



TO WHAT DEFINITE CAUSES MAY MALOCCLUSION AND ITS  
ATTENDING ORAL AND FACIAL ABNORMALITIES  
BE ATTRIBUTED?\*

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**I**NCLUSION of the words "definite causes" in the title of the present symposium on etiology of malocclusion conveys not only what such a discussion entails, but a concern for the comfort of those attending this meeting. Many hours would be required to cover the subject comprehensively.

HISTORY

Assumptions, erroneous and otherwise, concerning causes of malocclusion date in literature from as far back as Hippocrates (460 to 355 B. C.). Every century, at first, and later every decade has added some new theory to the theories already enumerated. Brash points out in his recent book on *Aetiology of Irregularity and Malocclusion of the Teeth* that Norman Kingsley in 1879 showed considerably more concern over this subject in his book on *Oral Deformities* than was shown twenty-eight years later in 1907 by Edward H. Angle in his book *Malocclusion of the Teeth*. Norman Kingsley devoted the first two chapters of his book to the subject of etiology, while Edward H. Angle devoted to it one short chapter, and this the fourth and not the first. As a result of the tremendous influence which Dr. Angle's writings have had upon the early development of orthodontia as a specialty, this attitude of his toward etiology has been assumed by a very large percentage of the practitioners of the last twenty years. As is evidenced by the recent comprehensive handling of the subject by Brash and the numerous articles in the literature written by other well-qualified men during the past four or five years, the pendulum seems to be swinging the other way. We now find the whole profession more or less concerned not only with the proximate factors contributing to irregularity and malocclusion with which we all are quite familiar but also with the more involved investigation of remote factors.

REASONS UNDERLYING INCREASED INTEREST

This increasing interest in etiology cannot be explained solely on the basis of aimless curiosity or the desire for truth. On the contrary, it seems to me that two outstanding facts have brought about this change in attitude; first, the present day interest in preventive dentistry; and second, the high incidence of relapse among cases treated according to former standards of diagnosis based on erroneous assumptions concerning etiology. Those who are interested in etiology because of their primary interest in prevention realize that we cannot go far in outlining preventive methods as long as so little is known of the etiology of dental disease, not only malocclusion. Those interested in etiology because of their serious concern

\*Section of symposium presented before the Thirty-First Annual Meeting of the American Society of Orthodontists, Toronto, Canada, May 18 to 20, 1932.

over failures or relapse in the treatment of complicated cases know that in the past there has been an extraordinary development in the technic of mechanical treatment compared with which the accumulation of facts concerning the nature and origin of malocclusal conditions has suffered. They have the profound desire to know more about causes and therefore to have surer foundations upon which to exercise the orthodontic art.

#### DEFINITION OF TERMS

In considering the subject of etiology, we should not lose sight of the fact emphasized by Johnson that "Cause in a literal sense means that which produces a result without which it would not exist. It is also the sole determining effect of a condition. On the other hand a factor is one of a number of elements which combined together produce a result. The forces which determine the development of any part of a living organism are so complex that we must, rationally, when referring to etiology, speak in terms of contributing factors, not of cause, in the definite literal sense." And to quote from Simon on the same subject, "But What Is 'Cause'? We must understand this concept very clearly if we would understand etiology. After all, every cause results from a preceding cause, and these lengthen into a chain of causality, which, scientifically, has neither a beginning nor an end. Its links serve both as cause and effect and, according to Goethe, constitute an indivisible phenomenon. To select a link from this chain of causality as a 'cause' is a fiction, that may be necessary and practical in order to comprehend a section of the endless chain; but this cannot be established empirically, because it does not exist in objective reality."

#### CLASSIFICATION

In a recent article on this subject by N. N. Bery, causes of malocclusion were classified "under three main headings: general, proximal, and local, each division having several subdivisions." It seems to me that a classification dividing all factors into remote or proximate would be none the less clear and easy to understand, and I would use the term "factor" rather than "cause" except when referring to conditions known to produce exclusively and specifically the anomaly in question.

The peculiar thing about it all is that after carefully perusing the literature on the subject, one is inclined to come to the conclusion that classification of etiologic factors cannot possibly go very far at the present level of our knowledge. We do have fairly definite evidence of the operation of certain proximate factors such as: (1) premature loss of deciduous teeth, (2) too long retention of deciduous teeth, (3) retarded eruption of permanent teeth, (4) premature loss of permanent teeth, (5) anomalies in size of teeth, (6) anomalies in number of teeth, (7) caries, etc.; but we are in 1932 still obliged to accept as valid one of the conclusions of Hellman following his paper on "Etiology of Class II Malocclusion," written in 1922, namely, "that when put to test not one of the recommended factors is found to bear any definite relationship to a particular form of malocclusion." He says in another item of summary of this same paper, "Most of these factors of malocclusion accepted by modern orthodontists have come down to us by tradition, and are accepted on no other grounds but by the recommendations of some authority."

Says Woodbury in reporting "An Open-Bite Case" before this society in 1930, "To me personally—and this has been a cumulative experience—the out-

standing result of the preparation of this case report has been to drive home to me how little I actually know about the phenomenon that I have presumed to interfere with. It must be obvious to any one who has followed this presentation that the history is quite barren of anything significant. The etiology is frankly a blank. Thanks to the work of Brash, Hellman, Keith, Todd, and others, who have of late years brought a trained observation to bear on the problem of face and skull development, we are saved reporting that we have here 'a case of narrow arch due to mouth-breathing' and calling such a statement a diagnosis. Even a negative advance like this is worth something as being more in line with reality, but it leaves much to be desired."

#### IS ETIOLOGY UNEXPLAINED?

At first I was inclined to believe that so-called proximate factors were the only ones about which we knew enough to use as the basis for a paper. It was, therefore, my first intention to refer to them as the so-called definite causes of malocclusion, but the further I went into the study of these proximate factors above listed, the more uncertain I became as to their true place in a discussion of etiology. For a while—and I am not so sure I am not still in this frame of mind—I would have been one of the first to endorse one of the conclusions of Howard in his paper on "Inherent Growth and Its Influence on Malocclusion," namely, "The etiology of growth anomalies of the jaws and dental arches remains unexplained." Not one of the proximate causes listed above invariably produces the malocclusions classically attributed to it. "Not all spaces left by seemingly prematurely shed deciduous teeth close and thereby cause malocclusion. Every space is not potentially a space-maintainer case,"\* as all of us know. The real problem of etiology lies in the answer to this question: If these conditions are causal in their relationship, why do they not invariably produce malocclusion?

#### CONTRADICTIONS IN THE LITERATURE

It is interesting to note that Brash in his recent monumental work does not dare to issue a classification of etiologic factors. His findings are definitely negative, and yet Bery includes as causes, either general, proximal, or local, practically all of the conditions concluded by Brash to be of negative importance. Contradictions of this nature in themselves lead one to believe that we are far from the end of the road.

To quote from Bery, for example, "Rickets appears in childhood and also in middle age, and sometimes during pregnancy. In children, the deciduous teeth erupt late and are lost early, giving rise to malocclusion."

Now to quote from Brash on the same subject, "I think it is improbable that many are now likely to take the facile view that irregularity and malocclusion are manifestations of rickets as such. It is too obvious that there is no direct relation between them. But if it is clear that children suffering from even severe rickets may still possess well-formed arches, that human rickets, in fact, affects the jaws in only a minority of cases, and that there is no sign of the characteristic pathologic condition of the bones in the vast majority of irregularities and malocclusions, it

\*Moore, G. R.: Preventive Measures That May Be Utilized in Clinical Operative Dentistry From the Viewpoint of the Teacher of Orthodontia, *Proc. Am. Assn. Dental Schools*, 1932.

may well be thought that a lack of vitamin D is unlikely to have anything to do with these conditions."

Bery's assertions are based upon the very attractive supposition that bone deprived of calcium salts and thereby softened lends itself readily to distortion under muscular pull. Brash's statement is based upon a sincere effort to understand the facts fully, in spite of attractive suppositions and assumptions. If one were to examine the literature of our profession, hundreds of such contradictions concerning etiology could be found. This is only natural, since the subject is so complex, and it is the nature of human beings to explain even when they fail to understand.

#### ACCEPTED CAUSES ON TRIAL

It will be apparent to any one who goes deeply into this subject that what we need more than anything else is evidence. We do not have it now; we only have more each year than we did the last, and even then the whole mass of etiologic evidence is very limited.

To make a long story short, the researches of our careful investigators in the field of anthropology and the various branches of medicine and dentistry invariably lead to similar conclusions, namely, conclusions lacking specificity of the cause and effect relationship. After examining the findings of many of these serious investigators into the profound nature of our problem, one does not wonder at the negative nature of the conclusions of Brash. Brash's work constitutes a critical analysis of the entire literature on the subject, and his work is to be recommended to the attention of any and all practitioners of orthodontia who seriously wish to debunk the profession. We shall have taken a definite step in advance when we as a profession begin to realize that our time-worn accredited causes do not unerringly produce the classical irregularities and dentofacial deformities we are accustomed to attribute to them.

#### PROXIMATE FACTORS

To be more specific, how many of the following more or less accepted proximate causes of malocclusion always produce a malocclusion when they exist: pernicious habits, mouth-breathing, abnormal frenum labium, lack of muscular balance, harelip, cleft palate, osteomyelitis, geographic tongue, macroglossia, premature loss of teeth, too long retention of deciduous teeth, retarded eruption of permanent teeth, anomalies in size of teeth, anomalies in number of teeth, and caries? Very few of the above list will invariably produce a malocclusion. Where they do act, they act only as factors along with other factors seemingly more deep seated.

#### HABITS

At certain ages it might be said that finger and lip habits bear a positive relation to definite types of malocclusion, but no one who has observed these habit cases can doubt that there is a wide variation in the susceptibility of individuals to these deformations of the jaws and malalignments of teeth as a result of the application of external pressure. The habits themselves may vary in intensity, but it is logical to believe that habits of equal intensity will produce quite a different degree of deformity in different individuals. Factors other than the habit itself have something to do with the end-result.



## MOUTH-BREATHING

Mouth-breathing has long been looked upon, and is still being looked upon by the majority of the profession, as one of the principal causes of distocclusion. In a recent paper by Howard on "Inherent Growth and Its Influence on Malocclusion," the author rules out by the process of elimination many of our traditional and empirical beliefs as to the mechanical etiology of growth anomalies in the form of so-called forces of occlusion by demonstrating statistically either that percentages fall far too short to be conclusive, or that there was a definite negative correlation. He struck at one of the time-worn tenets of orthodontic etiology when he showed in this same paper statistical evidence that only 159 of the 500 tonsil and adenoid cases were mouth-breathers and, more pertinent still, that of the 159 mouth-breathers, 94 exhibited normal jaws, normal arches, and normal occlusion, while only 22 exhibited Class II, Division I deformity.

This does not seem logical, but etiology is not based on logic. It is based on evidence such as this evidence which Howard presents. If we examine carefully collected data on each and every one of the above list, we shall find an amazing irrelevance of many of them to malocclusions which have been attributed to them in the past. At least, up to the present, no outstanding evidence based on the examination of large numbers of cases can be presented in support of more than one or two of the accepted causes of malocclusion.

Nothing stirs up one's interest in research and his realization of the need for careful research so much as the preparation of a paper on etiology. When one realizes how meager is the evidence upon which one may base one's statements one is struck with a feeling of helplessness. "But," according to Woodbury, "to understand more fully the causative factors at work, of course we may bow to the complexity of the problem and conclude that it is insoluble. We may not admit it quite so baldly even to ourselves, but our paramount interests will proclaim abroad that we have accepted this defeatist attitude. We shall become as clever technicians as possible and let it go at that. This state of mind might be quite appropriate for a medieval guild of craftsmen, but it is hardly the spirit that should permeate a twentieth century association with scientific aspirations."

## PROGRESS

Today there are several indications that dentistry as a profession is anxious to enhance its knowledge of fundamentals in science in so far as they affect dentistry, medicine, or both medicine and dentistry jointly. One of these indications is the establishment of graduate connections in several of our Class A dental and medical schools for advanced study leading to advanced degrees. In this advanced work the student is usually given considerable responsibility in the selection of his departments of study and investigation. Dean Winternitz of Yale is encouraging perhaps the most advanced development in dentistry of recent years by creating schools for graduate dentists from other institutions and giving them the opportunity to increase their knowledge of medicine while encouraging them in further research in the specific problems of dentistry. Ultimately an important link may be formed between dentistry and medicine which, though it may exist rather satisfactorily in some parts of the country now, is admittedly not a general thing at present. Of outstanding importance in Dr. Winternitz's program is the fact that

he is not ignoring the historical developments of dentistry and medicine. He realizes, according to Gompertz in the May, 1932, *Dental Cosmos*, that "The condition is such that the two fields cannot suddenly be united; they must be brought together, rather, by a gradual evolutionary process in which both participate." With this very mature and superior grade of dentist being given advanced instruction in the graduate schools of the country and under the program of Winternitz at Yale, the future holds much in store for us in the solution of basic problems in the field of orthodontics.

From these men, just referred to, with superior training in the fundamental problems of etiology, future papers on the subject, we hope, can be of more positive nature than those of the present. After very carefully analyzing the literature, Brash admits that "Most of the conclusions at which we have now arrived seem to be negative."

#### CONCLUSIONS OF BRASH

Brash draws the following conclusions, among others, which are of particular interest in this discussion:

1. "The problem is essentially one of disharmony of teeth and jaws, and of the growth mechanism by which the erupting teeth are guided into occlusion; it is therefore a problem of the evolution and growth of the facial skeleton.

2. "It is probable that the bone conditions which underlie the great majority of malocclusions are determined in the early years of life. Malocclusions of the deciduous dentition are common, and it must be recognized that variations in the relations of the jaws similar to those found in malocclusion occur in the fetus and in the newborn child."

It would be interesting to have a talk with Brash on this phase of his concluding remarks. Every one here is aware of the fact that some jaws apparently underdeveloped or exhibiting conditions of apparent malocclusion at an early age, have been repeatedly shown to develop without treatment into unquestionably normal dentitions. In these cases, we can seldom predict dentofacial conditions of later stages from conditions in the dentition at early stages. To do so, we shall have to open up an entirely new field of observation now unknown. Now all we can do is to observe carefully—wait and see.

To continue with Brash's conclusions:

3. "There is an evolutionary background to the problem, implying selection and inheritance of variations in the marked reduction of the face and jaws relative to the skull which has occurred; the alveolar element of the jaws has been reduced more than the basal; and there has also been a reduction in the number and relative size of the teeth, but not to such an extent."

Bearing on the subject of selection above referred to, it might be interesting to quote from Badcock as follows: "Distocclusion, with accompanying projection of the maxillary front teeth, long ago seized upon by the continental caricaturist as an English characteristic, is one of these variations, and my impression is that it is becoming increasingly common in this country. Sexual selection may have something to do with this, for the rather narrow maxilla, the maxillary teeth just in evidence, the dimple above the chin associated with this condition in its less pronounced forms may give the face a character which undoubtedly has attractions of its own; indeed it has been stated by a woman who ran a canteen in France dur-

ing the war, and was assisted by various young women, that those with this peculiarity invariably got married; and another very observant woman tells me that she has noticed that it is exceptional to meet women with jaws so formed who have remained single."

To quote from Schultz on "Human Variations," "Many, if not most, variations are in themselves entirely inconsequential to the individuals possessing them. Nevertheless some may gradually become eliminated, whereas others may appear with increasing frequency in later generations, not because they are 'good' or 'bad,' but because they regularly happen to be associated with some other variation of a decidedly selective value. A multitude of selective factors is continually at work among constantly occurring human variations. Some of these factors have lost their efficiency with advance in civilization, but that very advance has introduced new selective processes of sometimes very doubtful benefit to the human race."

To continue the conclusions of Brash:

4. "The evidence is inconclusive that the form of the jaws and the position of the teeth are directly related to nutritional factors.

5. "Vitamins and hormones have a special relation to growth in general and to the growth of the skeleton in particular. There is, however, no evidence in support of speculative opinions that common irregularities and malocclusions may be due to such causes in the absence of other characteristic signs."

On this subject it might be well to quote from an editorial note in the *Journal of the British Dental Association* of 1922, reporting a lecture by Sir Arthur Keith on "Hormones and Evolution." "He (Keith) suggests that in acromegaly there is a continuation or resurrection of the process of growth. The changes in the face in acromegaly are chiefly concerned with the function of mastication, so that the pituitary through its hormone controls the growth of the face, which Keith aptly calls the chief signboard of race. In the gorilla there is an enormous development of the masticatory apparatus; in the chimpanzee the development is less. The difference between modern man and Neanderthal man, in respect to jaw and neck, corresponds in degree to that between the gorilla and the chimpanzee. The pituitary acts on the various anatomic elements and adapts them to a single physiologic end. As to how the pituitary acts in acromegaly, Keith suggests that it is not merely due to an increased dose of the growth hormone being thrown into the circulation, but must be more complex. He instances those curious cases of hemihypertrophy of the jaws in children which are occasionally seen and suggests that these should be regarded as localized forms of acromegaly, due to a disturbance of the hormone machinery which lies behind generalized acromegaly. In his own words, 'The anatomic elements of a single functional unit are picked out.'"

From the last part of this quotation it would seem that there is evidence to refute Brash's assumption that hormones have no selective action on the jaws in the absence of other characteristic signs.

6. His conclusion on the subject of dysfunction as a factor is as follows: "The form of the jaws, their relation to each other and the position of the teeth in them correspond to their 'function' in the general sense of evolutionary adaptation. But if a 'trophic influence of function,' in the sense of a stimulus set up or released by the 'use' of the jaws in the individual, is essential for normal growth, this is



not necessarily quantitative; and it is probable that there is a very wide range of activity within which the normal growth will take place. The alleged influence of disuse of the jaws owing to the quality of modern diet has been greatly exaggerated, and there is no reason to believe that their activity has fallen below the minimum required for normal growth."

7. "It is improbable that the tongue exercises any important direct mechanical influence on the general form and size of the mandible or in molding the form of the growing palate."

8. "There is no direct relation between the teeth and the size of the jaws; this is indeed the essence of the problem of irregularity and malocclusion. Eruption and movements of the teeth, mechanical cusp action and the development of occlusion are part of the mechanism through which etiologic factors may work; their detailed study may therefore throw light on the etiologic problem."

9. "Habits and other local mechanical conditions can affect the occlusion only when they are such that force is habitually exercised upon the teeth in a given direction for a long period; the conditions must be comparable to mechanical regulation."

10. Although he had no knowledge at the time his book was written of the work of Howard above referred to, Brash says, "It has still to be proved that there is any significant correlation between the presence of adenoids and the incidence of deformities of the jaws and palate." Howard, as we know, goes a step further and shows a definitely negative correlation bearing out Brash's inference.

11. "Such evidence as we have of the inheritance of face and jaw form, racial and individual, the evidence from the study of malocclusions in families, and especially the evidence from comparison of occlusions in duplicate and fraternal twins all point to the genetic constitution as a primary factor. There is an opportunity for much detailed investigation of the modes of inheritance of malocclusions."

The text of the whole of Brash's book leads the way to his final remarks on inheritance. He laments, as do we all, the difficulties in the way of study of human inheritance but is sufficiently convinced of its importance as the logical side from which to attack the etiologic problem that he offers the following guide which he hopes may dominate future inquiry. It is as follows: "I suggest that the time has arrived to substitute for the provisional hypothesis of environmental influence in the wide sense—which appears to have inspired most of the investigations and most of the discussions that have taken place in the past—the other provisional hypothesis that irregularity and malocclusion are inherited conditions, and to let that inspire future discussions and future investigations."

In conclusion, may I speculate that under the guidance of leaders in the biologic aspects of dentistry who are certain to emerge from educational developments lately conceived, the most optimistic of contemporary orthodontists cannot vision the possibilities of discovery as a result of which succeeding generations will benefit. The etiology of growth anomalies of the jaws and dental arches remains indefinite. Indefinite etiology presumes certain treatment limitations. The public we now serve will benefit largely in proportion to our realization of these facts. The need for research in etiology is evident, and the possible public benefits of such research are apparent to all.



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TO WHAT DEFINITE CAUSES MAY MALOCCLUSION AND ITS ATTENDING ORAL AND FACIAL ABNORMALITIES BE ATTRIBUTED?\*

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TO PRESENT this subject properly would require an exhaustive review of orthodontic and allied literature. I have, therefore, limited my consideration of the subject to those authorities who have made a close study of the etiology of malocclusion.

The cells of the human body are ever subject to any influence or stimuli, trophic or atrophic. It would be beyond our mental capacity to follow the changes of even one cell. What then, of the myriads of others? Conklin states, "The development of a human being from a germ cell is the climax of all wonders, greater even than that involved in the evolution of a species or in the making of a world."<sup>1</sup>

The more thoroughly investigated, the more complex we find the natural phenomena to be. Nature is always greater than our theories, and, with few exceptions, hypotheses which were satisfactory at one stage of knowledge have to be extended, modified, or abandoned as knowledge increases.

One could outline the usually accepted causes of malocclusion as offered by the textbooks, but little or no evidence is given in support of the so-called causes. The subject as stated is a challenge, in a sense, to name some causes of malocclusion which are definite in character.

To understand the subject better, it will be best to analyze the various elements contained in it by a thorough understanding of the meaning of the important terms used.

It is one thing to state a cause; it is another thing to state a definite cause. It is still a third matter to attempt to analyze the data in the literature as to a definite cause, in which one's own attitude or interpretation is involved. The first may be considered a narrative; the second, a drama; the last, a comedy or a tragedy, as the other fellow sees it.

Before we consider the matter of cause, let us define occlusion and malocclusion. Occlusion is the contact, or relation, of the teeth in one dental arch to the teeth of the opposing dental arch. "Malocclusion is a deviation from the normal to such an extent as to interfere with the proper function of the teeth."<sup>2</sup> McCoy states, "When the growth and development of the denture are interfered with, to the extent that the teeth cannot assume their normal relations, they are said to be in malocclusion."<sup>3</sup>

Before we can understand malocclusion of the teeth, we must have some conception of the normal relation of the teeth and the opposing dental arches.

Angle gave us the ideal to think about, and to work to, when he described the

\*Section of symposium presented before the Thirty-First Annual Meeting of the American Society of Orthodontists, Toronto, Canada, May 18 to 20, 1932.

cuspal relation of the maxillary and mandibular first permanent molars, with the mesiobuccal cusp of the maxillary first molar occluding in the buccal groove of the mandibular first molar—a very definite relation.<sup>4</sup>

LeRoy Johnson defines and discusses normal occlusion as follows: "Normal occlusion of the teeth is the condition of tooth relations that is most effective in maintaining and establishing in its most stable form the organization of the living being. Typical occlusion indicates in a general way the extent of variation of structural relations that in ordinary circumstances should be accepted as normal, and, as at the present state of our knowledge we are without means of ascertaining the interaction of occlusal phenomena with other vital processes of the organism, our concept of type is the best index we have of the normal. Nevertheless, we should remember, in our diagnosis of borderline cases, that we are concerned with biologic problems and that the imperfection in occlusal relations or alignment of the teeth that carries a case just beyond the limits of type may not indicate a perversion of physiologic processes. Such is the essence of the biologic point of view; it desires absolute knowledge and control.

"Approach the problem from whatever angle you will, and I believe, in the end, you will agree with Hellman that 'the normal occlusion conceived by the orthodontist to present 100 per cent perfection is a myth.' We are concerned with occlusion in its relation to the functional activities of the entire organism. Comparative study of the occlusal relations of the teeth of many individuals is a basis upon which to build and it is nothing more. So in conclusion, let me repeat—the problem of normal occlusion is, in the last analysis, a physiologic problem. The reference to a certain condition as normal occlusion means that there exists a relation of the teeth in function that will help to establish and maintain in its most stable form the organization of the individual organism. It does not necessarily mean perfection in the surface relations of the teeth."<sup>5</sup>

From a biologic point of view, normal occlusion is not the definite relation of the teeth we should like to have. There are variations in size, form and position, and yet the relation may be considered normal, though not ideal.

Since the chief term in the assigned subject is the word "cause," a discussion of its meaning is apropos. As defined by Webster, cause is that which produces or effects a result; that from which anything proceeds, and without which it would not exist.

Johnson says, "A cause is that which occasions or effects a result; the necessary antecedent of an effect; that which determines the existence or condition of a thing, especially that which determines its change from one form to another."<sup>6</sup>

Etiology of any disease is now considered from the basis of "factors" instead of any immediate cause. The presence of bacteria is only one factor. We must distinguish between a "cause" and a "factor." "A factor is a constituent. It is one of the elements, circumstances, or influences that contribute to produce a result."<sup>6</sup>

Brash says: "It is absolutely clear that irregularity and malocclusion of the teeth are not in the least likely to be found to depend upon any single immediate cause; a great many factors may have to be taken into account to explain fully even the simplest case."<sup>7</sup>

McCoy states, "The fact should ever be borne in mind that any given case of malocclusion is not necessarily to be explained or attributed to one cause or group of causes. Frequently many factors may be operative, and this possibility should not be lost sight of."<sup>8</sup>

The term "cause" in its true sense seems to limit materially the discussion of the subject assigned, and would be sufficiently limited without the modifying word "definite." When the term definite is used, we think of something fixed or exact. In mathematics, by following certain fixed rules in addition, subtraction, multiplication and division, one obtains certain definite results.

In chemistry, by following certain definite laws, we are able to find certain definite end points. In bacteriology, we are able to isolate certain microorganisms as a diagnostic evidence of disease. Similar results may be expected each time.

For years astronomers have been noticing certain deviations which the planets make from the usual course in their orbits. By careful study of these variations, and applying them to the precision instruments associated with the use of the telescope, far in the celestial realm the new planet, Pluto, was discovered.

The mathematics problem, the chemistry reaction, the focusing of the large telescope at the new planet Pluto, were with the expectation of a definite result. All information was analyzed and correlated; definite results were obtained.

The complexity of the aforementioned mechanical problems cannot be compared to that of the primordial cells to the full development of the human organism. In the former, the factors were largely known. In the latter, the complexity is such that only the Creator is capable of knowing.

Now let us consider some problems in the field of biology.

How great a part heredity plays in producing irregularities of the teeth, is something we should like to know. It is generally considered to have some control over growth and development.

Johnson gives us this thought: "It has been said that heredity need not be considered in orthodontia. It seems to me that we must interpret such a statement from the standpoint that the term heredity as used is given to mean the gross transmission of characters, rather than its full biologic significance. To ignore the fact of heredity in any study of development, normal or abnormal, is not consistent with modern scientific thought. Even though we grant that today there is no evidence of the inheritance of malocclusion, to dismiss the question of heredity, because of this, would be to leave out material that constitutes an essential part of the foundation of dental science in the study of development."<sup>9</sup>

While some definite information has been obtained on the influence of the endocrines, we feel that a further study of this vast field will give us some additional and valuable information. The orthodontic profession especially is cognizant and appreciative of the valuable contribution to the literature of the data developed by our own C. C. Howard. Yet there is nothing tangible that we can use more than to say that an abnormal function of each gland is a factor. He has inspired us to give a greater consideration of this factor when we are making a diagnosis of a malocclusion.

Diet, nutrition, and calcium metabolism are important factors in their influence on growth and development. The research work and study given this



subject by McCollum, Howe, Marshall, Hatfield, Ketcham, and others are developing some interesting and valuable information. As yet, however, evidence is lacking that these factors should be elevated to the plane of causes of malocclusion of the teeth.

Johnson says, "Diet enters into the physiologic complex which constitutes the individual. The manner in which it is expressed in development is determined as much by the nature of the individual as by the quality of the food. Children born of the same parents, eating the same foods develop differently. The personal equation is ever present."<sup>11</sup>

Brash discusses malnutrition as follows: "Apart from the fact that the skeleton is the last part to suffer in general undernutrition, as in starvation and inanition, the evidence is lacking that general defects of nutrition have any selective action on the jaws; and the mere fact that poor physique and malocclusion are both prevalent is no argument that they are due to the same cause. . . ."

"Malnutrition and rickets may of course occur in individual children from any rank in life, but in general there seems to be little doubt that there is a social distribution of these conditions. . . . Hellman has suggested that the children of the wealthy in New York, in spite of the fact that they do not suffer to the same extent from premature loss of deciduous teeth, show more malocclusion of the permanent teeth than the children of the poor. If this statement of a social incidence is of a general application, then it will require very cogent evidence to show that malnutrition as such is an important factor in the etiology of malocclusion."<sup>12</sup>

The developing of information relating to the vitamins and sunshine has been received most favorably, but they are so closely associated with nutrition in their influence on growth and development that we do not know just what effect each has separately.

Too long retention of deciduous teeth is often considered a cause for irregularity of the permanent teeth. Is this really the cause of a permanent tooth's being deflected in its eruptive process, or, is the growth of the tooth germ at an angle and erupting abnormally, the cause of the roots of the deciduous tooth having no physiologic reason to resorb? Certainly the latter premise is a basis of doubt.

We observe many instances in our practices in which too long retention explains the condition; however, we have no data substantiating the statement that prolonged retention of the deciduous teeth is a definite cause of malocclusion.

The presence of supernumerary teeth may or may not produce a malocclusion, depending upon the location of the impostors. If they erupt near the permanent teeth, they will crowd them out of the line of occlusion. However, the mere presence of supernumerary teeth in the alveolar process does not necessarily indicate irregularity or malocclusion of the teeth.

Malformed teeth, also, may or may not be a factor influencing the position and relation of the teeth, depending upon the degree of malformation, and the influence of other factors.

Premature loss through shedding and extraction of the deciduous teeth, or by accident, may cause a shifting of the teeth, deciduous or permanent, to such an extent that the eruption of one or more permanent teeth may become impacted or

crowded out of the line of occlusion, and in addition may cause an arrest of development of the dental arch, thereby effecting a disharmony in the dental arches. The tardy eruption of the permanent teeth may effect a similar result.

Caries is usually regarded as being responsible for allowing approximating teeth to shift and produce malocclusion.

However, cases are common in which the factor of the development of the mandible is sufficient without the aid of the stimulus of the erupting teeth to develop the arch to such an extent that there is little shifting or tipping of the approximating permanent teeth. Each tooth, therefore, erupts with ample space.

Although the extraction of permanent teeth is usually followed by a change in position of the approximating teeth, we have also observed cases in which little or no change followed. Whether the maintenance of the relation was due to mechanics of cuspal relation or to some other factor cannot be definitely determined.

Congenital absence of one or more teeth is regarded as an influence in the development of irregularities of the teeth, but in well-developed dental arches, congenital absence is not necessarily a cause, as the teeth and the dental arches are often in normal relation.

In considering the influence of the absence or loss of the deciduous teeth, the delayed eruption of the permanent teeth, caries, prolonged retention of deciduous teeth, and all other local factors, it would be interesting to know what percentage of cases result in normal occlusions in which these local conditions have had an opportunity to manifest themselves.

Regarding these conditions, Brash says: "The influence of the teeth upon the jaws may be summed up by saying that while they are responsible for the local arrangement of the alveolar bone in which they are set, they cannot of themselves affect the general form of the jaws, or of the alveolar arches. We must, I think, agree with the thesis put forward by A. F. Lundstrom, that occlusional conditions are unable either mechanically or by means of function to alter the size or form of what he calls the 'apical base'; in other words, that the apical base controls occlusion, and not occlusion the apical base."<sup>13</sup>

Through observation and from the textbooks, certain habits have come to be considered as causes of malocclusion. The same habits, however, do not produce the same results in all cases. There may be other factors involved.

The history of a habit is not sufficient ground for stating it as a cause of an irregularity without a demonstration of its mechanism. Caution should be exercised not to allow a history of a habit to lure one's thought away from the study of the deeper and basic factors. But if, after the habit has been corrected, the malrelation of the teeth, through normal function, becomes normal, one might consider the habit as the cause of the irregularity.

Samuel J. Lewis<sup>14</sup> is developing some interesting evidence along this line of study. We are awaiting information as to why a habit will produce a certain effect in one case, while in another it does not.

Mouth-breathing has been considered one of the causes of malocclusion and facial abnormalities, because, it was thought, of the abnormal pressure of the muscles and cheeks on the sides of the dental arches. C. C. Howard in a study of

500 nose and throat cases in the Good Samaritan Hospital in Atlanta, developed data showing that of the 159 mouth-breathers in this group, 94 (59.1 per cent) had normal jaws, dental arches and occlusion.<sup>15</sup>

In the evidence developed by Dr. D. McKenzie in 222 cases of adenoids at the Central London Throat and Ear Hospital as reported by Brash, it is shown that the presence of adenoids does not necessarily interfere with the proper growth and development of the palate. He found normal palates in only 40 per cent of the children who had adenoids, and he also found deformed palates in children who had never had adenoids. Northcroft, after discussing the evidence mentioned above, and that of others, including his own, concluded that mouth-breathing is not a primary cause of malocclusion.<sup>16</sup>

Pathologic condition of the faucial tonsils has been regarded as a cause in producing malocclusion, the patient seeking relief by thrusting the mandible forward. If this act is repeated persistently enough, it is supposed that the teeth eventually become locked by the cuspal relation in this new position.

In the findings of C. C. Howard, in 500 tonsil cases, the data show that there are only 21 mesioclusions. There are 22 cases of neutroclusion in which the growth problem is not involved, and 88 cases of neutroclusion in which the growth problem is involved. There are 23 cases of distocclusion. There are fewer cases of mesioclusions in the findings than any other type of malocclusion.<sup>15</sup> This statistical report does not harmonize with the general orthodontic opinion in regard to the cause of this type of irregularity.

Relative to the influence of the size of the tongue on the jaw, Brash gives the following: "Hypertrophy of the tongue is not necessarily the direct cause of an associated enlargement of the jaw; they may both be due to a common cause; . . . also, that if the tongue possesses any mechanical influence in the widening of the dental arches which takes place during growth, this influence is exerted through pressure on the teeth, and not on the bone directly."<sup>17</sup>

He further states: "It by no means follows that in the individual the size of the jaw is caused by the amount of activity of the muscles. Certainly the convincing evidence that it is so, has yet to be produced." He contrasts as an example the great muscular strength of an achondroplastic dwarf and the muscular weakness of an acromegalic giant.<sup>18</sup>

In the course of our clinical observation, especially of certain types, the frenum labium has been regarded as a cause of malocclusion. As a general consideration, however, it is only a factor in producing it. John V. Mershon<sup>19</sup> points out that what is often thought to be a frenum labium of abnormal size passes away in many instances with the eruption of the permanent teeth. Because of this fact, he states that he does not remove this tissue.

External pressure, as suggested by Stallard,<sup>20</sup> in some cases may produce a change in the position of the teeth, but, as a general proposition, there are other factors, such as weakness of structure, metabolism, and nutrition; these must be eliminated before a definite diagnosis could be made as to cause.

I have been in search of evidence supporting definite causes of malocclusion and have been rather disappointed that there is so little positive evidence recorded. We appreciate the difficulty of obtaining such data on growing structures. The

result of the research in progress by our members and those working in allied professions is highly commendable, and we feel that their further efforts will be justly rewarded. The lack of known definite causes points to the need of collecting further data and doing further research relative to growth conditions about the dental arches and jaws.

In the study of this subject, I have been impressed by the fact that there is little actual evidence supporting definite causes of malocclusion; that there is need of a broader scope of consideration in our diagnosis; and that we should consider every factor which might have an influence on growth and development, and the position and relation of the teeth.

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DISCUSSION SYMPOSIUM "TO WHAT DEFINITE CAUSES MAY MALOCCLUSION AND ITS ATTENDING ORAL AND FACIAL ABNORMALITIES BE ATTRIBUTED?" BY DR. CROSBY,

DR. MOORE AND DR. FLESHER

*Dr. Adelbert Fernald, Boston, Mass.*—I do not remember hearing mentioned the subject of effect of occupation on irregularities. Up north where the Eskimos, especially the women, chew raw dried hides in order to soften and prepare them so they can be worked into clothing, they invariably wear their teeth down so sharp that very soon they produce an end-to-end bite. The women especially, when they reach thirty-five, forty or more years of age, wear their teeth down almost even with the gum. Dr. Waugh, who has been up north, no doubt has observed these conditions. That may not be a cause of abnormality, but it is very noticeable that invariably



they produce an end-to-end bite as they wear the teeth down closer and closer. I thought that might be an interesting subject to report.

I also understand that the old-fashioned shoemaker, who holds steel nails in his mouth and pushes them forward with his tongue day after day and month after month, almost invariably wears the end of his front teeth off. That may not produce any abnormality except to produce teeth slightly irregular from wear.

The men who habitually smoke an old clay pipe wear a hole in the teeth above and below, and they have to break the stem of the pipe off and force it back into the mouth to get a better hold.

I also understand that continually blowing glass affects the teeth to some extent, probably in the muscular pressure of the lips. What that effect is, I cannot tell, but I think different occupations may affect occlusion more or less.

*Dr. Lloyd S. Lowrie, Chicago, Ill.*—I wish to compliment the gentlemen who have taken part in this symposium upon the general covering of the subject of etiology, but it seems to me that they have not discussed the topic assigned to them. I am afraid, also, that they have, in their perusing of the literature, particularly the biologic side of it, been overawed by the investigations being made by certain gentlemen and by their conclusions.

Some of the conclusions of one of these gentlemen, who has been most quoted this morning, seem to me do not coincide with my clinical experience, and I am afraid that if the Society does not take up any general discussion of this thing there is going to be a wrong impression made by the presentation this morning.

I sometimes think the issues are beclouded by attempting to define terms that we use and give a too definite meaning to them instead of just letting the terms go, assuming they will convey the impression to others that they customarily convey in general use.

It seems to me that for practical purposes it does not make a great deal of difference whether we are discussing a cause or a factor in malocclusion. What we want to know is: Can we say definitely that certain things do precede malocclusion and seem to have been active in bringing them about? Whether you call it a cause or a factor makes no difference to me.

I think it is generalizing a little too much to say that all causes and factors are just links in an endless chain. Suppose they are. We can only deal with the links in the chain that are nearest to us, and within our grasp and within our influence. Why not try to determine the links in that chain that we can deal with? Just because we cannot go back to some link that is very distant from us is no reason why we should not take careful consideration of the links that are near at hand.

To be a little more definite, a supernumerary tooth may be definitely the cause of a malocclusion. Just because they are not causes in all cases is no reason for keeping them out of a list of definite causes of malocclusion. A supernumerary incisor erupting between the central incisors is definitely the cause of that malocclusion in that area. It may erupt in some other part of the mouth and not cause malocclusion.

It has been cited that thumb-sucking is not necessarily a cause of malocclusion because it is not invariably so. Well, beating a railroad locomotive to a grade crossing is not necessarily or invariably the cause of a fatal accident, but you can cite many instances where it was, and I say that the same thing applies to thumb-sucking. Thumb-sucking in some cases, I feel quite certain, is the cause of malocclusion, so why not list it as sometimes a definite cause of malocclusion?

Mouth-breathing being a cause of malocclusion has been doubted, and some authorities have been quoted as saying it apparently has no direct bearing upon malocclusion. I feel that is wrong. I think clinical experience would counteract that theory that has been advanced here this morning. I believe Dr. Cryer was perfectly right when he attempted to explain the mechanism by which mouth-breathing causes malocclusion, and it is largely the displacement or abnormal function of the tongue. I believe it is perfectly correct, and I want to state my definite disagreement with Brash as quoted here this morning, that tongue pressure is not a considerable factor in some malocclusions; in fact, possibly the direct cause of certain malocclusions. I believe the fact that mouth-breathing is not the cause of just one form of malocclusion is explained

by the fact that the tongue has different effects in different cases of mouth-breathing. If the tongue is habitually held in the floor of the mouth, in the mandible, in the case of mouth-breathing, I am quite certain it gives the typical horseshoe-shaped arch that we find in some Class III malocclusions. I am quite certain, also, that it enlarges the mandible itself by making pressure upon the soft tissues overlying the lingual surfaces of the roots of the mandibular teeth.

I should like to see this discussion take a little different form. I believe that there is quite a variety of local or proximal causes or factors that could be enumerated, and I do not believe that just because we cannot determine all the biologic factors that enter into malocclusion we are to throw up our hands and say we cannot determine a cause for a particular case. We should keep trying.

I had the pleasure of making the personal acquaintance of Dr. Eugene Talbot years ago when I was starting in practice, one of our scientific men who took the attitude that orthodontic efforts were futile unless we could determine the causes of malocclusion. You, of course, know how his ideas ran to degeneracy, that all malocclusion was the result of degeneracy in some form, and because he could not determine the mechanism of this working of degeneracy that all of our efforts were in vain.

I believe we can do a great deal of good while we are attempting to determine the etiology of malocclusion, and that we should not just sidestep the issue because we are not all workers in scientific research.

*Dr. Ira B. Stilson, Providence, R. I.*—I want to say just a word in support of Dr. Lourie's contention. We have all thought that we saw a definite relation between certain forces, or causes if you wish, and certain types of malocclusion. Perhaps we did not.

Probably we could class scientific investigation with laboratory findings. We have often been told that when laboratory findings did not coincide with clinical evidence we should disregard our laboratory findings.

*Dr. V. E. Barnes, Cleveland, Ohio.*—I think we may conclude from the three papers we have heard that we have got to the point where we begin to know that we do not know much about the subject. We have listened in the past and have read in the past this and that about etiology, and we have had authorities quoted, and the authorities knew practically nothing about the subject. They had to put something in their books about etiology and most of us swallowed it.

Before we study the etiology of a malocclusion or deformity we must know what the normality is, and we have had those who say that there is no such thing as a normality. There is such a thing as a normality, or practical normality, and that is the absence of deformity. We do not understand what the normality is, or even approximately, and before we study the deformity we must study the best cases we can get, both in skulls and in the living subject.

In some studies I have made of the best arch formations I could find, I found the conception we had of the arch form was totally different from that which I found by actual measurements of the arch forms in the best subjects I could find, both in the living subject and in the skull.

My observations seem to lead to the fact that the arch form is that of a true ellipse, and not the bone well form or the one that Hawley modified from bone wells, or what I had previously concluded myself from arch forms I had found which seemed to be nearly perfect.

Briefly, we have been conceiving that the normal arch form was a curve for the anterior part of the teeth, including incisors and canines, and that straight back from the canines to the first molar was a straight line. None of the best formations I could find showed that characteristic. In all of those there was a decided outward curve, so I think before we go into the study of the etiologic problem we must study normalities, or we must study the best conditions we can find in all races.

I have with me in my room some charts I made of some of these formations. Every one of them shows this elliptic form. Even one of the tribes in Australia compared very favorably in arch form with that of the Eskimo, one of Dr. Waugh's specimens. So I want to plead with you to study the normals before you can get any conception of what the abnormal is.

Dr. Howard, of Atlanta, has been quoted as saying he found 54 per cent of these cases studied as normals. What is the normal? On what basis did he judge that to be a normal?

What basis have we for assuming that normality? If you will study the literature, you will find that we have practically nothing, and I want to plead with you for a better study of the normals, and we shall have a different conception of what Dr. Johnson claims to be the individual normal, which I say is an abnormality.

*Dr. Bernard L. Hyams, Montreal, Quebec.*—During the presentation of these three papers on the etiology of malocclusions, I have heard no reference to the matter of prognosis. For the past eight years I have been engaged in preparations to attack the subject of prognosis in orthodontia. When it comes to expressing definite statements in this regard, the same wall is confronted that these gentlemen have encountered in the study of etiology, namely, the utter indefiniteness of the causes of malocclusions.

The fundamental basis underlying our research along these lines is as humble workers on patients, and our real interest lies in what we can reasonably promise the prospective patient. Even if our positive knowledge of etiology is not great, the important matter from the practitioners' aspect is that the percentage of success in the treatment of the various malocclusions be compiled and made available.

From the findings in my own practice the position I occupy today is that I can neither promise definite or lasting results nor can I morally discourage an applicant who is very eager to try. Once the possibilities of both sides are explained in the light of present day knowledge, it depends upon how much the issue means to the individual.

From our experience, I think the picture is not a black one. We are all doing a great amount of useful service along with the occasional failure, rendering lasting service in many cases, and in that the profession of orthodontics has well justified itself. That is the side of the question we should not permit ourselves to lose sight of.

*Dr. Homer B. Robison, Hutchinson, Kans.*—I feel that we have at least accomplished this one thing decidedly from these papers, and that is that we shall surely go home and make a greater effort to ferret out some of the causes of the conditions that the essayists have referred to, that is of cases that we know and they know are not successes.

I wanted to concur in the statement of Dr. Lourie especially in regard to mouth-breathing in its relation to malocclusions. There was one thing that was not brought up here. When a patient begins mouth-breathing, the function of the mucous membrane is reversed. It is a known fact that in many instances, especially in rachitic children, about the time of puberty and during menstruation sometimes the mucous membrane of the nose, particularly the membrane covering the turbinate bones, will hypertrophy in less than an hour, almost closing the nose.

Frers and Coffin made some experiments on the cause of mouth-breathing, and they found when the child had an irritation of these tissues, the nose began to close. The more the nose closed, the more they breathed through the mouth. Frers referred to the fact that organs which cease to function atrophy. The nose then becomes dry and begins to swell, and here we have the vicious circle. The more the nose closes the less they breathe through it, and the less they breathe through it the more it closes.

Reference was made both by Dr. Moore and by Dr. Flesher to the long retention of deciduous teeth. As I see it, this condition could be physiologic, pathologic, or biologic, but I feel sure those conditions are more biologic than physiologic or pathologic. Unquestionably there is a faulty metabolism in these cases which causes a lack of resorption. I cannot state this authentically, but this has been my observation.

One thing I wanted to emphasize particularly was Brash stating he did not regard the tongue as having anything to do with the development of the arches. I scarcely see how anybody could make such a statement. The fact that we are the only speaking animal and the only animal with a chin would prove that this is probably what developed the chin in the human. Chattering monkeys of South America present more chin than the ordinary monkey, which, I believe, bears out my contention. Surely there are no muscles about the face or neck that function as much as the muscles of the tongue in normal speaking and in normal chewing, and knowing as we do that the muscles of the superior hyoid are attached more or less to the mandible, it is quite evident that their function will have some effect on bone development. I think you have probably seen the tightening of these muscles to such an extent that you cannot depress them with the hand. Unquestionably, that would have some effect on bone growth.

*Dr. S. J. Lewis, Detroit, Mich.*—I could not let this opportunity go by without saying a few words. I did not hear the first paper, but did hear the last two.

Relative to the subject of etiology, I think one of the most important things that came out of the White House Conference on Child Health was the need of coordination between laboratory workers and clinical workers. Those who are working in laboratories or with isolated groups, often have an entirely different viewpoint than those who are in private practice. This means that more private practitioners should enter the field of research.

I think we often dwell too much, as Dr. Lourie said, on the difference between cause and factor. What we are interested in is what, under certain conditions, produces malocclusion of the teeth and certain deformities of the jaws and dental arches. True, we know very little about definite causes, but let us not be too much influenced by such works as Brash. Brash is not an orthodontist, nor has he done any investigation along etiologic lines. He has worked on madder experiments in pigs, trying to learn just how growth processes affect the changes in the jaws. His book is a compilation of much material on etiology, but if you will analyze his book, you will find that he often misinterprets material. For instance, he used some illustrations from a paper of ours in which he stated that it was apparent that spacing of the deciduous incisors was necessary if the permanent incisors were to be aligned normally. If he had read our paper carefully, he would have found that we found no definite relation between incisor spacing and alignment, a fact we have substantiated by further studies.

We are all concerned with etiology, and those of us who are working along investigative lines are trying to discover factual evidence for the benefit of all. We often find malocclusal conditions that may or may not be caused by certain factors, but certain evidence present at times, justifies the assumption that these factors do cause the condition. We know that the diphtheritic bacillus is often present in normal, healthy persons, but they do not all get diphtheria. The same thing is true in malocclusion.

Take thumb-sucking for instance. Dr. Moore stated that Brash considered it would cause malocclusion if indulged in over a prolonged period. What does he mean by a prolonged period? We know that thumb-sucking does cause malocclusion, and I believe that I have presented evidence that is incontrovertible. Our evidence also proves that a prolonged period is not always necessary to bring about this condition. Lately we have seen evidence of the effect of thumb-sucking on the palates of infants in the first few months of life. We have also found that in cases where the habit and the malformation are coexistent, breaking the habit will result in self correction of the malformation. Also, in cases where self correction has taken place, a resumption of the habit will again cause the preexistent deformity. We might just as well settle the thing and say that thumb-sucking may and does cause malocclusion. It is a definite cause.

The same thing is true with premature loss of deciduous teeth. It doesn't always cause malocclusion, but many times it does, so why not list it as a definite cause? Why beat around the bush? And so it is with other factors such as the tongue, lips, cheeks, etc.



## CLINICAL REPORT ILLUSTRATING THE APPLICATION OF ORTHODONTIC PRINCIPLES IN THE TREATMENT OF FRACTURES OF THE JAWS\*

A. C. GIFFORD, D.D.S., OSHKOSH, WIS.

IN THE arrangement of a case report it occurred to me that, although there are many methods of reducing and retaining fractures of the mandible and maxilla, the orthodontist's knowledge in the making of fixed appliances attached to the teeth to apply force is a great advantage in the placement of broken bones of the face and jaws.

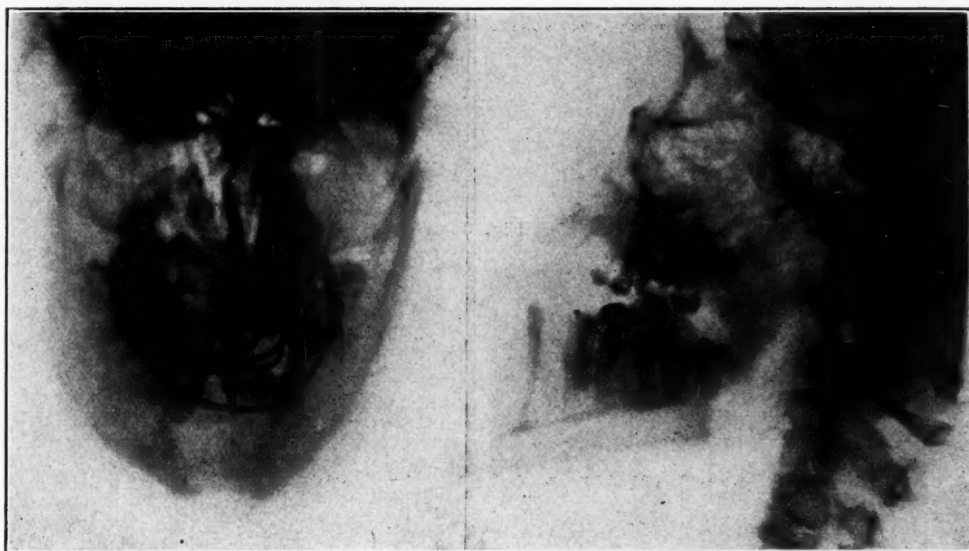


Fig. 1

Fig. 2

About noon on March 14, 1931, I was called by telephone, from a distance of about one hundred miles, to see a fracture case which had occurred the previous day. In the conversation I asked whether it were not possible for the patient to be brought down, but I was informed that he was in shock and could not be moved. I consented to make a visit to the hospital in the city from which the call came. I found a man still in shock, with a badly swollen face, and there had been an attempt at repair of the fractures which had been without result; there were also a badly lacerated lower lip and cheek on the left side. (Figs. 1 and 2.)

With the aid of radiograms we located a fracture at the neck of both condyles, and one at the symphysis of the mandible, where the right lateral had been entirely exfoliated, leaving a compound comminuted fracture. The left maxillary lateral, canine and first premolar had been knocked out with all the process thereabout.

\*Presented at the Thirty-First Annual Meeting of the American Society of Orthodontists, Toronto, Canada, May 18 to 20, 1932.

The left side of the maxilla was pushed in, and the teeth that remained in the fractured portion were turned into the mouth and were pressing against the tissues lingual to the right premolar and molars. The left maxillary sinus was opened with a hole into which one could put one's small finger. No washing or treatment was done. The opening closed with a healthy antrum as far as we could observe.



Fig. 3

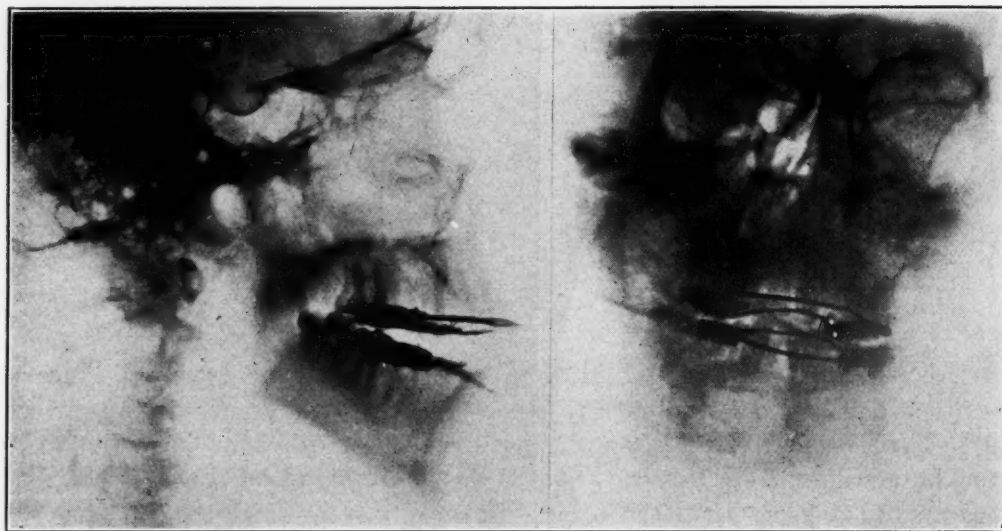


Fig. 4 A

Fig. 4 B

The physical condition of this young man, twenty-two years of age, did not allow any hypnotics at the orders of the physician in charge of his mental and physical welfare.

After a study of the conditions we came to the following conclusion. That we must release the wires now in place, and proceed to take compound impressions of each side, individually. This was done after pressing the left maxillary portion down to a position so it could be done satisfactorily.

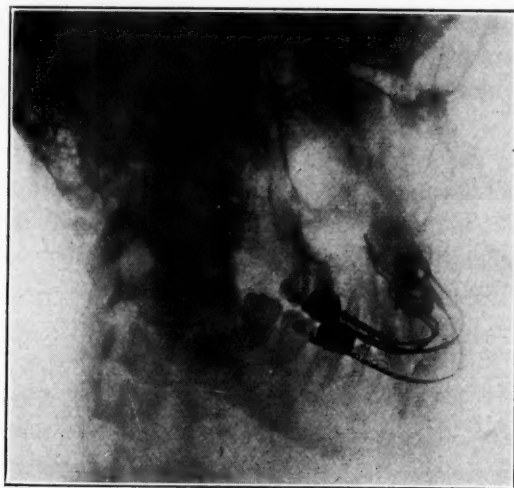


Fig. 5



Fig. 6

Fig. 7

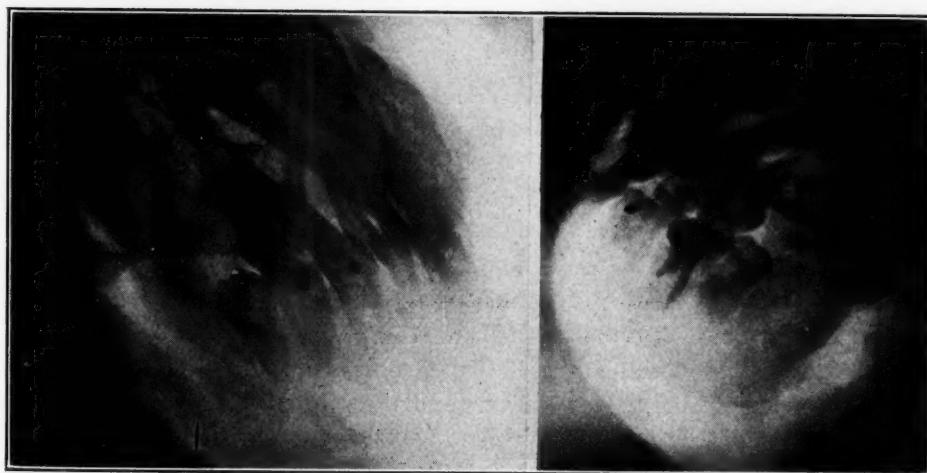


Fig. 8 A

Fig. 8 B

These four impressions were taken to my laboratory and run in stone. After overnight hardening we proceeded to make what we considered a correct mandible and maxilla for this man by cutting and trimming the anterior portions to land marks where they could be fitted together, making a mandible and maxilla of what we proportioned as the correct size. (Fig. 3.)

Knowing that there must be an opening in the anterior part of the mandible, where the right lateral incisor had been knocked out, which had been closed by those previously in charge, I adjusted the lateral portions accordingly, and the

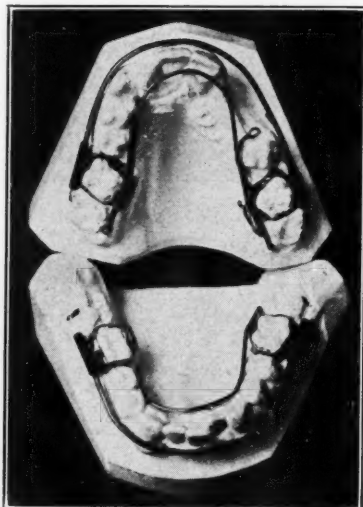


Fig. 9 A

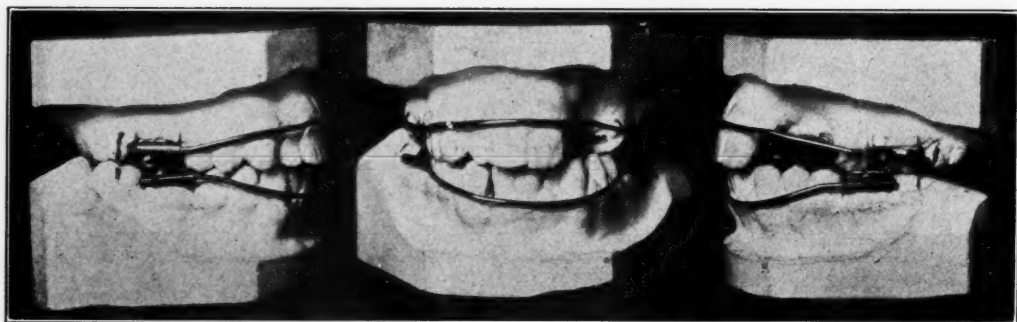


Fig. 9 B

fractured left portion of the maxilla was, of course, placed where I considered it should be. Upon these fashioned models I made the appliances.

I was mechanically minded in making and fitting these appliances. We placed orthodontic bands on the first molars, and a long buccal oval tube to take an oval wire made from 0.050 round wire was soldered to the right band. On the left side a round tube was placed to take 0.050 wire. An arch of this dimension was fitted. You will realize that by placing the oval end of the arch in the oval tube the wire will lie at a position on the labial and buccal surfaces of the teeth according to one's tube position. The left maxillary arch was pushed buccally in a section. After this was completed a lingual removable arch was made as a stabilizer.



The mandibular appliance was made with a labial 0.050 arch fitted with round buccal tubes soldered to first molar bands on both sides, and a lingual arch was also made to add to the firmness.

The fixtures were placed, at the hospital, on March 16 in the morning, about two days, less a few hours, after the impressions were taken. He was given no hypodermic injection or anesthetic, and we had very little difficulty or pain in placing these fixtures.

You will observe in Fig. 4 *A* and *B* that after the arches were placed there was an opening in the anterior part of the arches. This was due to the condyle fractures, and by wiring the arches, which were in place, together the teeth were brought in occlusion. (Fig. 5.) The mandibular arch was rotated to the left, and it was necessary to attach a wire in a position to bring the mandible forward on the left side to let the fracture at the neck of the condyle on that side into position.



Fig. 10

The jaws were released at the end of twenty-three days. Feeding, of course, was easy through the opening where the maxillary teeth were gone. The mandibular anterior teeth were in malposition, so they were wired to the labial arch, thereby closing the space where the right lateral was gone. (Fig. 6.)

The end-result is shown in Fig. 7, a radiogram showing the condition of the processes surrounding the fractured portion on the left side and the closing of that maxillary sinus.

Fig. 8 shows radiograms of (*A*) right and (*B*) left sides at completion.

These models in Fig. 9 were made from the impressions taken when the appliance was removed May 16. The appliances were placed on the models just as taken from the mouth, with the exception of the wires to the mandibular anterior teeth.

Fig. 10 shows the facial appearance of the young man one year after the accident. I am sorry the detail is bad in these pictures, but he moved away and we had difficulty in getting even these pictures. The left side was not taken.

# MINUTES OF THE THIRTY-FIRST ANNUAL MEETING OF THE AMERICAN SOCIETY OF ORTHODONTISTS

## WEDNESDAY MORNING SESSION

(May 18, 1932)

The opening session of the thirty-first annual meeting of the American Society of Orthodontists, held at the Royal York Hotel, Toronto, Ontario, was called to order at nine-twenty o'clock by President Charles R. Baker.

His Worship, William J. Stewart, mayor of the city of Toronto, gave the address of welcome, which was responded to in behalf of the Society by Dr. H. C. Pollock of St. Louis.

President-Elect Flesher assumed the chair and introduced the president, Dr. Charles R. Baker, who read the president's address.

A committee to report on the president's address was appointed by President-Elect Flesher as follows: Dr. Joseph D. Eby, Dr. Fred R. Blumenthal, Dr. George W. Grieve, Dr. Kirman E. Taylor, Dr. Allen E. Scott.

Dr. James D. McCoy, chairman of the Board of Censors, read his report. It was moved by Dr. H. C. Pollock, seconded by Dr. B. G. DeVries, and carried, to adopt the report of the Board of Censors as read.

On motion of Dr. James D. McCoy, seconded by Dr. W. T. Cate, it was voted to suspend the rules and ballot on the candidates presented by the Board of Censors as a group. The following men were elected to membership in the Society:

1. Ludwick, Paul G., 1019 Sharp Bldg., Lincoln, Nebr.
2. Welch, Will C., 510 Terre Haute Trust Bldg., Terre Haute, Ind.
3. Broussard, A. C., 1116 Maison Blanche Bldg., New Orleans, La.
4. Lussier, Earl F., 450 Sutter St., San Francisco, Calif.
5. Cooper, Herbert K., Woolworth Bldg., Lancaster, Pa.
6. Nolting, Paul R., 830 Medical Arts Bldg., Springfield, Mo.
7. Banks, Harry V., 1232 Republic Bldg., Denver, Colo.
8. Bowden, George F., 1232 Republic Bldg., Denver, Colo.
9. Vosmik, Charles J., 1334 B. F. Keigh Bldg., Cleveland, Ohio.
10. Wood, William P., 436 W. Lafayette St., Tampa, Fla.
11. Cunningham, J. Stier, 613 Medical Arts Bldg., Houston, Texas.
12. Higson, Alfred R., 9615 Brighton Way, Beverly Hills, Calif.
13. Fairchild, Guy B., 318 Bradley Bldg., Duluth, Minn.
14. Herbert, George H., 4767 Westminster Place, St. Louis, Mo.
15. Mogler, A. C., 4482 Washington Blvd., St. Louis, Mo.
16. Juett, Brooks, 1112 Fayette Bank Bldg., Lexington, Ky.
17. Kelly, Eugene J., 549 High St., Newark, N. J.
18. Smith, Richard A., 636 Church St., Evanston, Ill.
19. Donigan, Maurice L., Drummond Medical Bldg., Montreal, Canada.

A motion was made to suspend the rules and that the secretary cast the unanimous ballot of the Society for the applicants as read by the chairman of the Board of Censors. It was moved and passed.

Secretary Wood cast the unanimous vote of the Society for those members as named by Dr. McCoy, chairman of the Board of Censors.

Dr. James D. McCoy, chairman of the Board of Censors, announced that the board had counted the ballots of the Society and declared elected the following:

Member of Board of Censors: Harry L. Hosmer.

Librarian: Abram Hoffman.

Secretary-Treasurer: Claude R. Wood.

President-Elect: Leuman M. Waugh.

It was moved by Dr. James D. McCoy that the printed program become the official order of business for this meeting; seconded by Dr. Ralph Waldron, and carried.

Dr. Richard Summa of St. Louis and Dr. M. N. Federspiel of Milwaukee, having been proposed for honorary membership in the Society, it was moved by Dr. James D. McCoy that the rules be suspended and that vote be taken on the question; seconded by Dr. W. T. Cate, and carried.

Motion was made by Dr. W. T. Cate that the secretary cast one ballot for the election of Dr. Richard Summa and Dr. M. N. Federspiel as honorary members of the Society; regularly seconded, and carried. Secretary Wood cast the unanimous ballot of the Society for Drs. Summa and Federspiel.

Dr. Claude R. Wood read the report of the secretary-treasurer.

On motion of Dr. Ralph Waldron, seconded by Dr. A. H. Suggett, it was voted to accept the report.

Secretary Wood read the list of applicants for membership in the Society.

A symposium, entitled "To What Definite Causes May Malocclusion and Its Attending Oral and Facial Abnormalities Be Attributed?" was presented by Dr. Albert W. Crosby, New Haven, Conn; Dr. George R. Moore, Ann Arbor, Mich., and Dr. William E. Flesher, Oklahoma City, Okla. This symposium was discussed by Drs. Adelbert Fernald, Boston; Lloyd S. Lourie, Chicago; Ira B. Stilson, Providence, R. I.; V. E. Barnes, Cleveland; Bernard L. Hyams, Montreal; Homer B. Robison, Hutchison, Kan., and Samuel J. Lewis, Detroit.

The meeting adjourned at twelve-twenty o'clock.

WEDNESDAY AFTERNOON SESSION

(May 18, 1932)

The meeting convened at two-twenty o'clock, President Baker presiding.

Dr. Leuman M. Waugh, New York City, Dr. Samuel J. Lewis, Detroit, and Dr. B. E. Lischer, San Francisco, presented a symposium entitled "What Are the Requirements of Orthodontic Diagnosis?" Discussed by Dr. Harry B. Wright of Philadelphia and Dr. Synderman of Pittsburgh.

A motion picture, "Denture and Facial Reproductions," was presented by Drs. James D. and John R. McCoy of Los Angeles.

The meeting adjourned at five-fifteen o'clock.

WEDNESDAY EVENING SESSION.

(May 18, 1932)

The meeting convened at eight twenty-five o'clock, President Baker presiding.

The session was devoted to a discussion of the proposed new Constitution and By-Laws, which were adopted.

The meeting adjourned at twelve forty-five o'clock.

THURSDAY MORNING SESSION

(May 19, 1932)

The meeting convened at nine forty-five o'clock, President Baker presiding.

Secretary Wood read the minutes of the previous sessions, which were approved as read.

Dr. John A. Marshall of San Francisco presented his subject, "A Study of Bone and Tooth Change Incident to Experimental Tooth Movement, and Its Application to Orthodontic Practice." Discussed by Dr. Allen E. Scott of San Francisco; Dr. Samuel J. Lewis of Detroit; Dr. B. L. Herzberg of Chicago.

A clinical report, "Illustrating the Application of Orthodontic Principles in the Treatment of Fractures of the Jaws," was presented by Dr. A. C. Gifford, of Oshkosh, Wis.

Dr. F. A. Delabarre of Boston made brief remarks concerning the American Society for the Promotion of Children's Dentistry.

The meeting adjourned at eleven-thirty o'clock.

THURSDAY AFTERNOON SESSION

(May 19, 1932)

The meeting convened at two-twenty o'clock, Dr. James D. McCoy, chairman of the Board of Censors, presiding.

A symposium entitled, "What Are the Possibilities and Limitations of Orthodontic Treatment?" was presented by Drs. Joseph D. Eby, New York; B. G. DeVries, Minneapolis, and Paul G. Spencer of Waco, Texas. Discussed by Drs. G. W. Grieve of Toronto and Allen H. Suggett of San Francisco.

The report of the librarian was presented by Dr. Abram Hoffman.

Dr. Manly Bowles of Winnipeg, Canada, read a paper entitled "The Economic Problem in Orthodontic Practice."

The report of the Committee on Research was presented by Dr. A. H. Ketcham. On motion of Dr. Robinson, seconded by Dr. Suggett, it was voted to adopt the report.

The report of the Committee on Orthodontic Education was submitted by Dr. Lischer and read by Dr. Jones. Dr. Casto moved that the report be received, with the appended material submitted by Dr. Jones; seconded by Dr. Kelsey, and carried.

Dr. Waugh reported for the Inter-Relations Committee. On motion of Dr. Jones, seconded by Dr. Casto, it was voted to receive the report.

The following officers were nominated:

President-Elect: Dr. H. C. Pollock.

Vice-President: Dr. Paul G. Spencer.

Secretary-Treasurer: Dr. Claude R. Wood.

The following members were recommended by the Executive Council:

For Librarian: Dr. Abram Hoffman for a period of 3 years.

For a member of American Board of Orthodontia: Dr. A. H. Ketcham, for a period of 7 years.

*Budget Committee:*

Dr. Charles R. Baker	1 year
Dr. O. W. White	2 years
Dr. Ernest N. Bach	3 years

*Publication Committee:*

Dr. J. D. McCoy	1 year
Dr. Wm. A. Murry	2 years
Dr. O. W. Brandhorst	3 years

*Legislation Committee:*

Dr. Henry Hoffman	1 year
Dr. C. C. Howard	2 years
Dr. Allen E. Scott	3 years

*Revision of Constitution and By-Laws:*

Dr. F. M. Casto	1 year
Dr. Oren A. Oliver	2 years
Dr. C. C. Howard	3 years

*Relief Committee:*

Dr. Harry E. Kelsey	1 year
Dr. J. A. Burrill	2 years
Dr. H. A. Stryker	3 years

*Research Committee:*

Dr. Martin Dewey	1 year
Dr. A. H. Ketcham	2 years
Dr. Milo Hellman	3 years

*Board of Censors:*

Dr. W. A. Murray	1 year
Dr. C. B. Mott	2 years
Dr. Harry L. Hosmer	3 years

A motion was made that the committees be read separately and voted upon. Each committee was read separately, and a motion was made that the nominations be closed and the secretary cast the unanimous ballot of the Society for each committee as read.



The secretary cast the unanimous ballot of the Society for the librarian and the member of the American Board of Orthodontia and for the members of each committee as read by the president as stated above.

It was voted that Oklahoma City be the meeting place of the Society for 1933.

On motion of Dr. Ketcham, seconded by Dr. Kelsey, it was voted to refer the matter of the time of meeting to the Executive Council.

The meeting adjourned at sixty-thirty o'clock.

FRIDAY MORNING SESSION

(May 20, 1932)

The meeting convened at nine forty-five o'clock, President Baker presiding.

Secretary Wood read the minutes of the previous meeting, which were approved as read.

A symposium entitled, "Periodontal Studies in Relation to Orthodontia," was presented as follows: "The Theory of an Incompressible Periodontal Membrane," Dr. J. L. Synge of Toronto; "The Pericementum as Influenced by Physical Functional Modifications," Dr. Harold K. Box of Toronto; "The Application of Periodontal Physiology to Orthodontic Practice," Dr. R. Gordon Agnew of Toronto.

Dr. Abram Hoffman of Chicago, Dr. L. J. Porter of New York and Dr. Earl G. Jones of Columbus presented a symposium entitled, "What May Be Considered Rational Methods of Orthodontic Therapy?"

Dr. O. W. White presented the report of the Budget Committee, which was referred for action to the next business session.

The meeting adjourned at twelve fifty-five o'clock.

FRIDAY AFTERNOON SESSION

(May 20, 1932)

The meeting convened at four forty-five o'clock, President Baker presiding.

Secretary Wood read the minutes of the Friday morning session, which were approved as read.

A list of applicants for membership in the Society was read by Secretary Wood as follows:

Leonard Kohn, Brooklyn, N. Y.  
Curtis L. Benight, Denver, Colo.  
George M. Russell, Memphis, Tenn.  
William A. Giblin, Montclair, N. J.  
W. Glenn Phillips, Jacksonville, Fla.  
Everett A. Tisdale, Boston, Mass.  
A. A. Somerville, Toronto, Canada.  
Charles R. Brooks, Detroit, Mich.  
Leslie P. Abbe, Hartford, Conn.  
F. Clarence Thompson, Montreal, Canada.  
Frederick W. Black, Cincinnati, Ohio.  
W. H. Grinnell, Boston, Mass.

The budget which was presented at a previous business session came up for consideration and was reread by Dr. Wm. A. Murray.

On motion of Dr. Murray, seconded by Dr. Buckley, it was voted to adopt the budget.

The report of the General Advisory Committee was read by title, and will appear in the proceedings.

Dr. F. E. Haberle read the report of the Necrology Committee and moved the adoption of the resolutions concerning the deaths of Drs. J. Lowe Young, S. M. Weeks, Joseph Wyman and Victor Lay, seconded by Dr. Hoffman, and carried.

Dr. G. W. Grieve read the report of the Committee on the President's Address, and moved its adoption; regularly seconded and carried.

On motion of Dr. J. D. McCoy, seconded by Dr. Murray, it was voted to extend the thanks of the Society to the Local Arrangements Committee, the hotel, and all those whose splendid efforts made the 1932 meeting a success.

It was moved by Dr. F. M. Casto that the minutes of this meeting be approved by the secretary, and that all the acts of committees and officers during the last year be approved; seconded by Dr. Grieve, and carried.

The following officers were installed:

President-Elect: Dr. Leuman M. Waugh.

Secretary-Treasurer: Dr. Claude R. Wood.

President: Dr. William E. Flesher.

The new Executive Council is composed of the following members, as read by President Flesher:

President:	Dr. W. E. Flesher	} ex officio
President-Elect:	Dr. Leuman M. Waugh	
Secretary:	Dr. Claude R. Wood	
Dr. Charles R. Baker, Budget Committee		
Dr. J. D. McCoy, Publications Committee		
Dr. Allen E. Scott, Legislative Committee		
Dr. Earl G. Jones, Educational Committee		
Dr. A. H. Ketcham, Research Committee		
Dr. W. A. Murray, Board of Censors		
Dr. Oren A. Oliver, Constitution and By-Laws Committee		
Dr. H. A. Stryker, Relief Committee		

President Flesher announced the appointments of the following committees:

*Program Committee:*

Dr. P. G. Spencer, Chairman  
Dr. H. B. Robison  
Dr. E. N. Bach

*Nomenclature Committee:*

Dr. B. G. DeVries, Chairman  
Dr. F. A. Delabarre  
Dr. B. W. Weinberger

*Inter-Relations Committee:*

Dr. Joseph D. Eby, Chairman  
Dr. Lloyd S. Lourie  
Dr. W. W. Woodbury

*Necrology Committee:*

Dr. F. E. Haberle, Chairman  
Dr. B. Frank Gray  
Dr. Henry C. Ferris

He announced that he would appoint the Local Arrangements Committee at a later date.

Dr. Grieve made a few brief remarks concerning the advisability of soliciting dental manufacturers for contributions for the golf tournament.

Dr. A. H. Ketcham, president of the American Board of Orthodontia, made a report on the activities of the board, which Dr. Casto moved be received; seconded by Dr. Baker, and carried.

Report of the Legislative Committee was presented by Dr. Casto in the absence of Dr. Ernst. On motion of Dr. Waugh, regularly seconded, it was voted to receive the report for inclusion in the record.

Concluding remarks by President Flesher.

On motion regularly moved, seconded and carried, the meeting adjourned at five-twenty o'clock.

## DEPARTMENT OF CHILDREN'S DENTISTRY

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### SOME BASIC LESSONS TO BE TAUGHT OUR PEOPLE\*

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WALTER T. McFALL, D.D.S., MACON, GA.

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I CONSIDER this quite a privilege and a pleasure to meet with you and discuss for a while some of those things we are mutually interested in—a privilege because I think you are the second greatest people on earth. First, mothers, who give life to us, then you, who so materially help us in our living. And it is a pleasure to meet with you because it is always a pleasure to meet with and be associated with real workers, with you who are daily doing needful things, doing the greatest work in the world, serving and helping others, trying to do the greatest good for the most people, to help them to be happier, healthier, more useful, and to enjoy so much of life. The Prince of Wales adopted the motto "I serve," but it seems to me you nurses have interwoven into your life and work that motto of the Rotary Club—"He profits most who serves best," for I have seen, known, and heard of time and time again, the wonderful amount of good, helpful and really material, constructive, educational work you do daily. I have observed different phases of your work, and I believe you do have the opportunity of disseminating truth, good, and right living better than any public health worker I know. I want you to know I greatly admire, respect, appreciate, and commend you for the many channels in which you are expending your best efforts; your work is doing more good than you can ever know.

It seems to me there must be in the make-up of a successful nurse more qualities, quantities and gifts than in any other public health worker. I have often watched a nurse do splendid medical work then give the doctor all the credit, do a splendid piece of educational health work and give some church worker's club all the credit. I know something of your daily trials, worries, etc. I have been associated with your problems, but please continue to do as you have. "Bite off more than you can chew—then chew it."

Realizing that you must be an M.D., a nurse, a dentist, a teacher, an assistant, an executive, a minister and a thousand other component essentials, I want for a while to help you be better dentists, to teach more of dental hygiene, to gainsay splendid results that are daily being reported from preventive dentistry and dental hygiene.

Begin in your maternity work to stress dental hygiene. Can the expectant mother influence the teeth of the child? *Yes*. Teeth begin to form about forty days after conception, and a mother absolutely determines the dental apparatus of the child. Instruct the mother relative to her own teeth; there is no need for

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\*Read before the South Carolina Public Health Nurses.

dental ravages or destruction in the mother's mouth during pregnancy. She should have her own teeth attended to, especially prophylaxis and simple reparative work, use an antacid mouth wash, such as a tablespoonful of lime water or a teaspoonful of milk of magnesia, three times daily. Do not spare the tooth brush or dental floss. Most especially, to make strong teeth for her child and self, have the mother eat daily, foods that have bone building materials in them, such as greens, beet tops, spinach, cabbage, lettuce, celery, fruits especially uncooked, coarse breads, rye, whole wheat, and drink plenty of milk.

Sixteen different elements are needed in a balanced diet; insist upon them; aid the mother to work out a useful diet. We have been working from the wrong angle in trying to correct the dental ills of the world, the greatest malady of the human race. We must begin with the expectant mother and teach and help her if we are to stop decay and help bone formation of the new child. Remember that the body and tooth building materials for the baby come from only two sources, either the mother's food or the mother's tissues.

We must preach and teach from early to late the importance of mouth hygiene, for as Sir William Osler has said, "There is not one single thing in preventive medicine that equals Mouth Hygiene."

Breast-fed babies have the best teeth because the mother's milk is the ideal food. Insist on mothers nursing their babies; a prominent doctor has found that "Cow's milk was meant to make beef out of calves, not humans of babies." If the mother has followed a sufficient and well-balanced diet during pregnancy, especially rich in calcium and phosphorus, the baby teeth should erupt physiologically about as follows:

4 central incisors	6th to 8th month
4 lateral incisors	7th to 9th month
4 first molars	14th to 16th month
4 canines	16th to 18th month
4 second molars	20th to 24th month

Care of the teeth should begin in infancy, just as soon as the first tooth appears. Clean around each tooth with moist sterile gauze, give the baby cool boiled water, and at three years of age assist and begin teaching the baby the use of the tooth brush. Remember, if teeth are not properly cared for, if the correctly balanced diet is not encouraged and consumed, teeth will decay, resulting in toothache, pain and eventually in the too early loss of teeth. If we are to help a child to a good dental structure, it must be done in the prenatal and preschool age. Teach right habits, discourage and frown on the use of pacifiers, of lip and thumb-sucking. Give the child crust toast, hard simple foods to exercise his teeth, to aid in teething, and as the little fellow grows, teach him the correct foods to eat, encourage milk drinking, train the child to masticate thoroughly, and do not have said of us that "We boast of our civilization but starve our children." The diet the average American child is encouraged to consume is deficient in calcium and phosphorus, the essential bone forming, tooth building factors. There is an old Arab proverb, "He who does not masticate well is an enemy to his own life." Teach a child to chew his food well, keep away from him the milk or water until the end of the meal, so he will be forced to masticate his food properly in order to swallow it comfortably.



A mouth that is not kept clean is a good carrier for almost any germ. An unclean, uncared-for mouth is a most serious menace to the health and mental working efficiency of the children of school age and is one of the paramount obstacles in the control of contagious and infectious diseases so common in community and school life. A mouth that is unclean contributes to decayed teeth. When teeth decay they cause toothache, which is depressing to the child, making him irritable, listless, dull. Of course, he cannot properly chew his food, and therefore, digestion is impaired; he swallows with his poorly masticated food products of decomposition, pus, germs which cause a deficiency in nourishment and also intestinal disorders of a far reaching and serious nature. There is here an accumulative menace established, which in middle adult life often manifests itself in rheumatism, various disorders of the liver, kidneys, heart, also many cases of defective eyes, diseased conditions of ears, throat, glands, lungs, stomach, intestines, joints, and of the blood—all traceable to the lack of care in the mouth. An unhygienic mouth is an ideal incubator for any germ and for the dissemination of many diseases.

There is no one thing that causes teeth to decay, and there is no one thing that will keep them from decaying. We must advise the parents and children to eat good solid foods, cut out sweets and pastries, to chew thoroughly what is eaten, thereby exercising the dental tissues, to use the tooth brush at least twice daily, night and morning. Then, last, to keep the body toned, for the mouth is a good thermometer to the condition of health in a body.

I have touched briefly on just a few high places of dental hygiene. In conclusion, let me leave with you these thoughts: Ninety-five per cent of the school children in the United States have defective teeth, three to five cavities per child. Ten per cent of children use a tooth brush daily. Children with defective teeth fall behind six months in the eight year course, causing added expense to the state and nation. Neglect of the first teeth cause the permanent teeth to erupt out of position, resulting in improper development of the face and jaws, impairing the breathing tract and affecting general health.

Save the first permanent molars erupting at five and one-half to seven years of age. Proper diet, including milk, vegetables and fruit, together with careful home care of the mouth and teeth will help prevent tooth decay. Strong teeth are the result of good nutrition, thorough mastication, adequate prophylactic and dental care. Watch the next epidemic in your community and see how the clean mouths miss the sickness.

Help others to help themselves by preaching a gospel of the clean, well-kept mouth.

## PRACTICAL POINTS IN PORCELAIN WORK\*

D. HOYT SIMPSON, D.D.S., ATLANTA, GA.

**D**ENTISTRY may be divided into two classifications, i. e., theory and practice. Many things which sound logical and simple as theory, work out differently when put to trial in the office. This paper is a compilation of notes made from everyday routine in the office.

In presenting a paper on ceramics in this section of the country I feel very much like "the man who carried coals to Newcastle," because central Georgia contains the largest deposits and the best grades of secondary kaolin found anywhere in the world. Here will be a great ceramic center after this rich store of raw materials is developed.

In looking for the origin of porcelain, we find that the ceramic art dates from earliest antiquity. Egypt together with Greece and Rome produced luster ware in 600 B. C. We find in Greek mythology that Keramos became the patron saint of pottery, from which we have derived the word, "Keramics" or "Ceramics," the modern meaning of which is potter's earth, which is used to cover all the productions of the plastic art. In studying the ceramic art we give credit to Egypt for utility, to Greece for perfection of form, and to China for beauty of color. The word kaolin comes from the Chinese, meaning "high ridge," and refers to the place where it was found.

Porcelain is composed of kaolin, feldspar, silice, flux and pigments. Kaolin imparts strength and plasticity and forms  $4\frac{1}{2}$  per cent of the basal ingredients; silice forms  $13\frac{1}{2}$  per cent and maintains form, while feldspar forms 82 per cent, giving translucency. These are the basal ingredients of porcelain. The amount of flux controls the fusing point, and it is composed of ground Bohemian or flint glass.

### CERAMICS AN ART

Ceramics offers an inspiration and expression of true art in dentistry. It has been termed the art that hides art. The simulation and the copying of irregularities and abnormalities to the extent that the finished work cannot be detected are its ideal. The study of porcelain can develop for the student a good sense of esthetics, which will be shown in other branches of restorative work. Patients appreciate esthetics much more than is realized because the anterior teeth are the ones they are most familiar with. They see them most, brush them most, discuss them most and are most critical of them. There is no greater satisfaction of accomplishment than to have restored a disfigured anterior tooth with a beautiful, harmonious porcelain jacket crown; and then, too, the expression of gratitude from the patient is well worth one's efforts. It is always a source of wonder to the student of porcelain why more dentists do not take up this most interesting class of work.

\*Read before the Sixth District Dental Society, Macon, Ga., October 11, 1932.

TWELVE IMPORTANT USES OF PORCELAIN IN DENTISTRY

Fusable porcelain has a great many uses in dentistry. Its first and most important use is to reename teeth, i. e., the porcelain jacket crown; second, to replace contours, such as proximoincisor inlays; third, to relieve gingival irritations, i. e., with cervical inlays; fourth, to promote hygienic conditions under bridge-work; fifth, for its insolubility, i. e., in cavities where silicate will not stand up; sixth, as a nonconductor, i. e., to prevent thermal and electric shock; seventh, to replace lost gum tissue, i. e., used on saddles of fixed or removable bridgework; eighth, to form the gum portion on full dentures, i. e., a gum section baked to fit; ninth, for continuous gum dentures, i. e., all porcelain, baked on a platinum base; tenth, to stain artificial teeth for naturalness; eleventh, to prevent wear, i. e., for posterior occlusal inlays which oppose dentures; twelfth, in opening the bite, jackets on all teeth exposed to sight. There are also many other reasons that make it important for the modern dentist to know and to bake porcelain.

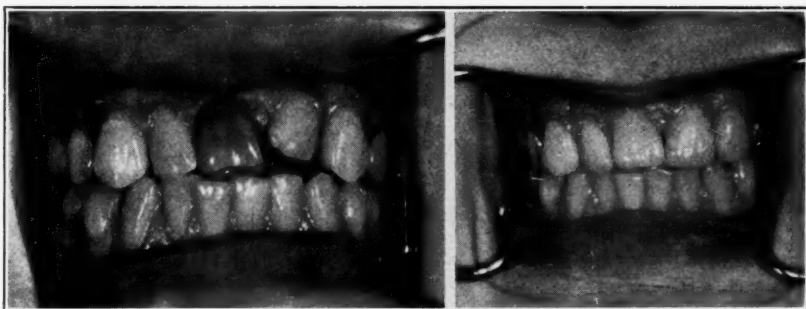


Fig. 1

Fig. 2

Fig. 1.—Typical appearance in which porcelain crowns are indicated. Loss of left maxillary central together with death of right maxillary central due to previous accident. Root canal work shows up favorably under x-ray examination. Extraction of incisors and bridgework had been considered. Orthodontia was resorted to in an attempt to close the space. Due to malformed premolars the median line could not be established.

Fig. 2.—Two central incisor porcelain jackets placed on left lateral and right central incisors in order to close contacts and realign teeth. Left canine shaped to simulate a lateral incisor. The jackets were made short of occlusion to prevent undue stress.

TO REENAME TEETH

The porcelain jacket crown reigns supreme as a restoration for the anterior teeth. When these teeth are discolored, broken down or abnormal in shape, no other material can supplant baked porcelain. Porcelain crowns preserve the vitality of the pulp, at the same time giving a lifelike restoration of the coronal covering, the enamel. With an accurate fit at the shoulder and a highly glazed surface, the gum tissue adjusts itself to the porcelain without irritation, becoming firm and pink. Jacket crowns may be used to close open contacts, to realign torted or rotated teeth, and to correct mild cases of malocclusion. (Figs. 1 and 2.) Unsightly bridgework may be eliminated by using the all porcelain bridge in short spans. The thimble jacket crown is indicated as a bridge abutment where maximum restorative strength and esthetics are desired. Pyorrhea pockets may be prevented by changing the anatomy with the use of jackets. In some instances, such as teeth that are too small, better appearances may be obtained by building the jackets slightly larger and lapping one over the other.

The first thing to do in preparing for a jacket crown is to make a sketch of the labial or buccal surface of the proposed crown. This is the first laboratory requirement. Note the form, irregularities and shape of the labial surface, whether flattened or convex from mesial to distal or from gingival to incisal. Note the axial angles, whether prominent or rounded. On this drawing mark the line between the different shades if they are prominent. This drawing is of invaluable help in the laboratory when the patient is not present. (Fig. 3.) The second lab-

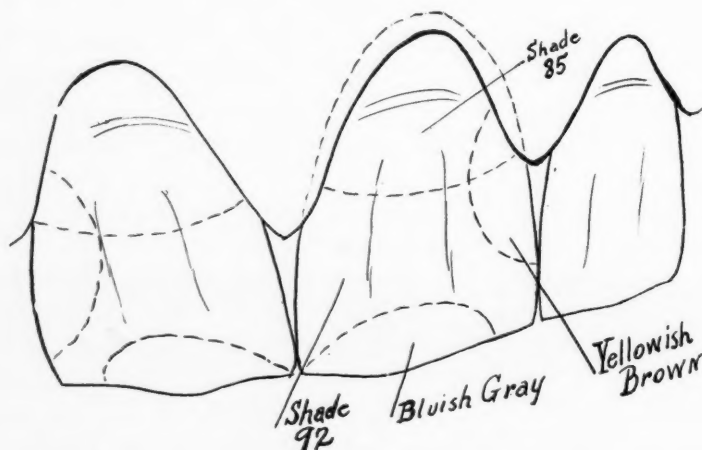


Fig. 3.—Sketch of anatomic markings of proposed crown. Shades, stains, irregularities and markings are recorded.

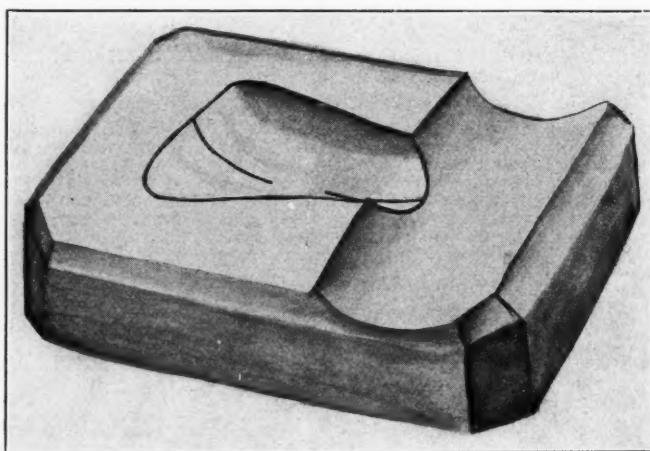


Fig. 4.—Mold which is made by investing a celluloid facing form in a plaster block. The celluloid is split part way toward the center from the incisal and gingival margins in order to facilitate the removal of the condensed porcelain.

oratory requirement is to select the shade blending best with the other teeth and mark this on the sketch. In selecting a shade, moisten the teeth and shade tooth. Have a dark background behind the patient. The best light should come over the operator's left shoulder. Sometimes a card placed above the patient's lip will shadow the anterior teeth so as to obtain the proper light. A selection that blends is better than one which exactly matches either approximating tooth. Seldom do we see two anterior teeth exactly alike in color. A slightly darker shade is better than one lighter than the adjoining teeth. The selection of color matches is a



most important procedure. Dr. Brickman of Philadelphia says, "The color of enamel when viewed microscopically in a longitudinal or transverse section was always found to be gray, ranging from a light gray to a dark or 'dirty' gray. The actual color of teeth in position is dependent largely on the pigment found in the dentin together with the blood in the pulp and other modifying factors. Gray in natural teeth is not a color—it is a tone whose intensity modifies the reflection from the dentin." The most accurate method for selecting a shade is to make up one's own shade guide of basic colors. This is not so difficult as it seems and gives one the absolute shade of that jar of porcelain which may vary considerably from a stock shade guide. This is due to large batches of porcelain being mixed together with variations in the different batches. A celluloid facing form is split part of the way from the incisal margin to the gingival margin. This is imbedded

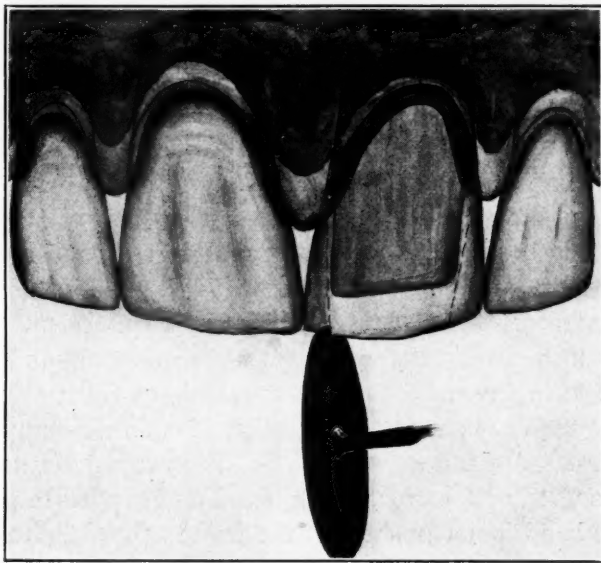


Fig. 5.—The beginning of the preparation for a porcelain jacket crown. This phantom sketch shows the proposed shoulder just under the free margin of the gum. The slice goes to a point just above the gum line. The gums are pressed back to prevent cutting them.

face down in a plaster or stone block. (Fig. 4.) Into this mold is vibrated the plastic porcelain, and the moisture is absorbed. A dense body of unfused porcelain is thus obtained, which may be removed from the celluloid and placed on silex for fusing. The color, number and pin hole may be carved before removing it from the mold. This basic color guide gives accurate results.

Next comes the preparation. In young patients take an x-ray picture to determine the size of the pulp. Administer a local anesthetic and use a stream of lukewarm water to relieve friction heat. Safe side discs should be used to make the mesial and distal slices. (Fig. 5.) A small carborundum disc may be used to serrate the labial enamel. This prevents cutting too deep and aids in removing a uniform thickness of enamel. The final color of the crown depends a great deal upon a uniform thickness of porcelain. Small mounted carborundum wheel stones are used to remove the remaining enamel. Now, a suitable copper band is selected, contoured to conform with the gingival curvature and adjusted to fit just below

the gum line. The curve of the gum margin determines the shape to make the band. Flatten the band labiolingually until it touches the adjoining teeth, and while holding it in position punch holes through the band, pushing from inside outward. Make two holes next each neighboring tooth, one labially and one lingually. The punctured metal on either side of the contact point forms a guide for the correct seating of the band. Another hole may be punched above the angle of the adjoining teeth to form a stop. The shoulder is next prepared just under the free margin of the gum with small stones, fissure and end cutting burs. To prevent cutting the gingiva, a rubber dam clamp may be adjusted to the tooth. After the preparation is complete the tooth is smoothed with fine sandpaper discs.

The finished preparation should present a shoulder one-half to three-fourths millimeter in width, slightly tapering axial walls, and rounded incisal corners. The shoulder, incisal and cingulum seats should be at right angles to the line of stress. Dr. McBean says, "It is a well known fact that a thin veneer of porcelain has greater strength where properly supported with a flat seat at right angles to the line of force than a greater amount of porcelain improperly supported. Were this not true, the Davis and Logan crowns of the past would never have fractured." The labial surface of the preparation should be flattened and should not be convex from the incisal to the shoulder, as this is often the cause of the crescent-shaped fracture in the gingival third, resulting from stress. However, care must be exercised in preparing the flattened labial wall so as not to endanger the pulp. With teeth which have a pronounced curvature from gingival to incisal this ideal will have to be compromised. The third laboratory requirement is the impression which is taken with the band filled with softened compound, and lubricated, care being exerted not to injure the delicate fibers of the peridental membrane. The fourth laboratory requirement is the selection of another copper band slightly larger than the first. A small strip of tin foil is wrapped around the tooth, and the second band is filled with softened compound and carried to place over the tin foil matrix. The band is not pushed all the way to the shoulder but just to the gingiva. This band is left in place and a plaster impression taken over it, covering the corresponding tooth on the opposite side of the arch. The tray should not be pushed too close to the teeth, which would cause the impression to fracture into several pieces on removal. Never use dissolving plaster, as heat softens the die when separating the cast. Fifth laboratory requirement (which is optional) is the taking of a second plaster impression, which will greatly aid in building the jacket. The sixth laboratory requirement is taking the bite. It is taken in base plate wax into which is folded a piece of paper. This prevents the teeth biting through the wax. After all these laboratory necessities are accumulated, the patient's welfare may be considered. A temporary crown is made using a celluloid crown form filled with temporary stopping. The crown is contoured to fit the shoulder, and holes are punched in the incisal corners for the escape of air. The crown is filled with warm temporary stopping and cemented to place with chlororosin. If the crown is filled with silicate, the pulp may be irritated unless sufficiently protected. Often the patient may be so pleased with the temporary restoration that the finished crown, with its built-in imperfections and delicate detail, is not fully appreciated.

*Laboratory Technic*

A wax collar at least one-half inch high is adjusted to the band impression and this is invested in plaster. The die is packed by jarring the medium soft amalgam to a point above the shoulder and packing dry amalgam for the remainder of the root. All excess mercury is squeezed out and the amalgam is packed hard, because a very strong die is needed. The root of the die is tapered slightly with its largest circumference about 3 mm. below the shoulder. This permits easy removal of the matrix from the die and also of the die from the cast. After the die is shaped and a notch or key is cut near the apex of the root for definite seating in the cast (Fig. 6), it is placed in the tin foil matrix of the first plaster



Fig. 6.—Shape to prepare die. Largest circumference about 3 mm. below shoulder, which facilitates easy removal of platinum matrix. The several-sided, tapering root, with the key cut near the apex permits definite seating and easy removal from the cast. It can be held with the fingers very easily in building the crown.

impression. The impression is stained and painted with separating medium, and the master cast is next run.

To separate the cast from the impression, trim down carefully until the staining shows over the incisal and occlusal areas. Then cut a groove parallel to this plane about one-fourth inch below the incisal edges. This portion can be pried off, exposing the incisal one-third of the teeth. This method of separation prevents breaking teeth off the cast. The die is removed from the master cast and inserted into the second plaster impression, and the working cast is run. The die fits in both master cast and working cast alike. About 1 mm. of the contacts of the adjoining teeth is shaved off the working cast. This allows overbuilding the crown, at the same time checking its alignment. After firing and shrinkage it can be tried on the master cast for a check. The master cast may be mounted on an articulator using the wax bite.

A pattern of paper is made on the die, and the platinum is cut according to this. The seam is made either on the mesial or distal surface, so as to leave the maximum thickness on the lingual surface. This applies mostly to maxillary teeth but is a safe rule to follow on all teeth. The least amount of burnishing and swaging to adapt the matrix is best, as the platinum becomes brittle soon enough and will split easily. Cellophane wrapped around the die for swaging reduces tearing of the matrix. This also applies for inlays.

There are several ways of building a crown, spatulation, vibration without matrix, vibration in a matrix, mechanical vibration in a matrix, whipping and gravitation. Dr. Gill of San Francisco has made some interesting studies of the physical results of each method. Personally, I prefer a combination of spatulation, whipping and gravitation. Overbuild the crown and exaggerate the carvings. Firing diminishes both. I prefer building the dentin portion and firing that first, then building on the enamel portion; in this manner the thickness of the enamel may be controlled.

### *Building*

Strength, translucency, durability and color are *built* into the crown. The methods may vary but one prime consideration stands out. That is *condensation*. The closer together one can cause the particles of porcelain to come, the better the result of firing. In the hands of the master ceramic artist, spatulation and carving produce wonderful results. The stroke of the spatula has to be developed just as the stroke of the brush of the portrait painter. Gravitation and whipping offer a quick method of condensation. Vibration in a matrix on the lathe or by hand gives the densest porcelain, but it is difficult to get color blendings unless the body is built, carved and fired first. Before building is started, be sure the matrix slips easily off the die. Many crowns may be ruined in trying to remove the build if the matrix fits too tight. Write the number of the porcelain on a spot of the mixing slab that has been ground. Pack the porcelain until it is hard and firm. Carving determines the density and manipulation of the porcelain. The humidity of the atmosphere makes building easy or hard. In winter place a pan of water on the burner and you may work porcelain much better by spatulation. If the build dries out too fast, it begins to crumble.

The crown is built approximately one-sixth larger than you desire it to be after firing, in order to take care of the shrinkage. After building sweep the porcelain off the shoulder with a stiff brush. The shoulder may be built in on the next bake. Porcelain shrinks toward the main body so there is nearly always a pulling away from the shoulder. Try not to entrap air bubbles in the building as this affects the shade and strength of the finished work. When the first building is complete, place it on a sagger on the shelf in front of the open furnace to dry out. When all the excess moisture is removed, the porcelain turns white, but when placed in the furnace it begins to turn dark. As soon as it turns white again, all the volatile materials have evaporated and the door may be closed. To close the door too soon would gas the porcelain and cause bubbles in its surface. Carry the furnace up to 1900° F. in five minutes and from there to 2350° F. in another five minutes, using a time clock. A definite result may be obtained from



temperature plus time. Better porcelain may be produced by fusing at lower temperatures over a longer period of time. This gives time for deeper vitrification, hence stronger and more translucent porcelain. The body bake need not be so translucent as the enamel, so shorter time may be employed to bring it to a high biscuit. The first bake should not reach the stage where glazing begins. It should present a roughened surface with dull color. The highest point for vitrification of 2560° F. porcelain should be 2400° F.; for 2300° F. porcelain, 2200° F.

After the first bake, be sure the crown slips easily off the die. Next the shoulder may be built in with the body color and then the enamel portion added. Carve all developmental grooves and anatomic markings deeper than you want them to be in the finished piece. The shrinkage makes them shallow. High fusing stains may be built into the surface or on the dentin portion depending upon the intensity of color you want. Hair line checks in the enamel may be built in with a fine hair or applied to the surface after firing. A small piece of silex covered with tin oxide built into the enamel portion gives the effect of a chalky spot in the enamel.

After the firing, the crown is tried on the master cast to check contacts, occlusion, contour, etc. The excess apron of platinum may be trimmed away and the margin ground flush with cardboard carborundum discs, always grinding from the porcelain toward the platinum. After grinding, always scrub with a stiff brush under running water in a stoppered basin. Dry porcelain is rubbed into the pores of the crown, and the finish build may be applied and fired to a glaze.

This is the three bake method. In the one and two bake methods both dentin and enamel colors are built before firing. This calls for skill in judging the amount of shrinkage and the thickness of the enamel. There is nearly always a pulling away from the shoulder in this method, which must be filled in, then the crown glazed.

In applying the glaze carry the high fusing porcelain to 2400° F. for two to three minutes. By staying 100° or more below the fusing point and holding for the necessary time, a more beautiful surface and a stronger crown are obtained. A high glaze gives a glassy surface and might cause devitrification. A low glaze leaves the tiny irregularities and waves in the surface, thus simulating nature. The labial surface may be polished with sandpaper discs lightly, giving a natural velvety finish. Do not cut through the glaze in using discs, then polish with tin oxide. The fewer number of times the crown is carried into the furnace the better the quality of the porcelain.

The crown may be carried to the mouth for final check-up on occlusion, contacts, shade, etc. Grinding lowers the fusing point of the porcelain; so any additions may not be glazed as much as the ground portions. Medium stains may be painted on the crown in the mouth using a mixing solution of 50 per cent glycerin and 50 per cent water which has been brought to a boil. This is covered with a glaze.

Particles of platinum left after peeling may be loosened with hydrofluoric acid. Cementation may be done with oxyphosphate or adhesive silicate cements. The occlusion should be checked from year to year with carbon paper, and if trauma is shown artificial wear may be produced with stones. This will prevent fracture after years of service.

## RESTORATION OF CONTOURS

The contour porcelain inlay is indicated in all anterior teeth in which the incisal angle has been destroyed and where there is sufficient tooth material to warrant its use. Many teeth have been crowned needlessly because of insufficient strength of silicate or inadequate retention of the porcelain inlay. With the lock-pin type of retention the tooth may be restored with the minimum destruction of sound tooth substance and the maximum retentive strength. I refer you to my article on the "Lock-Pin Porcelain Inlay" in the *Journal of the American Dental Association* of July, 1932.

## RELIEF OF GINGIVAL IRRITATION

The cervical inlay presents the simplest form of porcelain work and may be baked while the patient is in the chair. Oval cavities are prepared with a pit in one end for correct cementation. The matrix is burnished to the cavity using silk tape to hold the matrix in place. Each bake of medium fusing porcelain does not take long, and after each bake, reburnish the margins on the tooth. The crevice may be filled in by vibrating while holding the matrix in the lock pliers. Carefully remove the excess from the platinum apron with a camel's-hair brush. In this way the surface may be brought up to the margins and a glaze produced in two to three bakes. The indirect method, however, allows for swaging and provides more time for manipulation. The best impressions are obtained with the point of a cone of compound barely softened by heat, leaving the remainder hardened. Heavy pressure forces the gum tissue away from the margin and produces a clear, definite impression with sharp margins. The impression is boxed in, allowing three or four millimeters for the die surface outside the margins. This prevents fracture of the margins in swaging. Cellophane, mentioned before, is ideal in which to wrap the die and matrix for swaging, in order to prevent extensive tearing of the matrix. A tear that crosses the margin ruins that matrix. The first build is kept off the margins and is serrated. After firing, the second application of porcelain may be swaged. The inlay may be dressed flush with the die after it is built up. For this, use coarse cardboard carborundum discs running from porcelain to platinum. If stones are used, they should be light colored and never used on gold, and should be used under running water. After grinding always scrub under running water with a stiff brush. If coarse carborundum is used, it does not get into the pores so easily. The pores, unless filled with porcelain, leave pits in the glazed surface, so rub dry porcelain into these pores, using a clean napkin. Never carry the porcelain to its fusing point and hold, because this might produce devitrification or "balling up," thereby distorting the fit. With a high glaze the inlay has a glassy smooth surface. A low glaze leaves some of the tiny waves in the surface thus simulating nature. A drop of water placed on the inlay facilitates peeling, as the platinum seems to leave the porcelain much more easily. To etch, place the inlay face down on warmed base plate wax. Seal all margins with a warm spatula. Place a drop of hydrofluoric acid on the inner surface, and this should produce the desired roughness quickly. If extreme etching is desired, touch the drop of acid with a heated instrument, being careful not to melt the wax.

Before cementing, wipe out the cavity with a pledget of cotton dampened in phenol, this relieves sensitiveness, and prevents weeping of the gingiva in cavities extending below the gum line. Neutralize the phenol with alcohol.

A cement may be tried for color match by mixing water with the powder and using this on the inlay in the cavity. The adhesive silicate may also be used, but it does not have so much retentive strength as the oxyphosphate cement. It cannot be used successfully in shallow cavities extending below the gingiva. The ideal cement for porcelain work has not been developed as yet. Dr. Brickman of Philadelphia has been experimenting with a semiopaque porcelain for the dentin portion, which he claims will eliminate the cement showing on inlays as well as jackets.

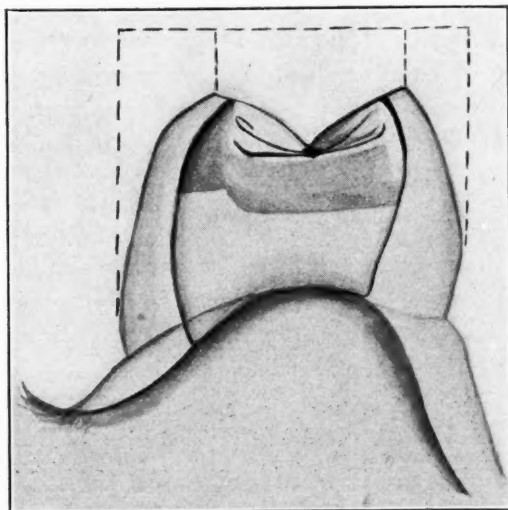


Fig. 7.—Anatomic shape to construct bridge pontic. The distance between the cusps of the former natural tooth being approximately half the buccolingual width.

#### HYGIENIC BRIDGES

With the pontic type of interchangeable porcelain tooth for bridgework, a much better class of bridge may be constructed. The old porcelain pontic, which had to be made practically from a tube tooth, had several drawbacks. In case of fracture, the bridge had to be removed. Occasionally it is needed yet to replace long pontics. In grinding a pontic to fit the tissue and approximating teeth, always leave the embrasure and interdental space as similar to nature as possible. A flat contact collects food and is difficult to clean with brush or tape. If the space is left large enough to thread tape between the bridge teeth, a more hygienic piece of work is the result. Small saddles with little curvature should rest gently on the tissue. A deeply curved saddle fitting over the ridge causes inflammation, and it is difficult to pass tape underneath the pontic. The occlusal surface of the bridge should be narrow, to eliminate stress. The distance between the points of the cusps is approximately half the buccolingual width. To produce this anatomic substitute, the porcelain must be shaped accordingly. (Fig. 7.) Always glaze the saddles or tips after grinding. A root tip should never have a conical shape and be placed up in the socket. A dome or hemisphere shape is as

much as should be used to encourage healthy adaptation of tissue. The pontic of the three tooth, all porcelain bridge may be constructed by filling a celluloid crown form with porcelain, condensing and carrying it to a low biscuit. The celluloid burns off quickly. Shape and attach it to one jacket with sticky wax. Porcelain is built in and it is fired on silex to a high biscuit. A groove may be cut on the lingual surface of both the pontic and the other jacket, and a platinum tube built into the jacket abutment while the irridio platinum pin is built into the dummy. This forms a stress breaker and also allows for contraction of the porcelain on firing.

#### INSOLUBILITY

For permanence, baked porcelain greatly outlasts the silicate cements. It has been said of the materials for filling teeth that only three may be considered permanent: the gold foil filling, the gold inlay, and the baked porcelain inlay or crown. Even with an imperfect margin, porcelain resists decay, and baked inlays are often seen after years of service in which other materials would not have preserved the teeth so long. This is due to its imperviousness to moisture and its insolubility.

#### A NONCONDUCTOR

Large porcelain inlays will not produce thermal or electric shock, such as metal fillings do, and therefore, may be placed in deep cavities or very sensitive teeth. A small porcelain disc has been recommended to be sealed over an exposed pulp as a protection against thermal or electric shock.

#### REPLACES LOST TISSUE

Pink porcelain saddles are ideal to replace lost tissue in the anterior part of the mouth. Often a difficult extraction or accident destroys the labial plate of alveolus. In these cases the replacement on either fixed or removable work may be done most esthetically in porcelain.

#### GUM SECTION

A section of gum tissue may be baked for full dentures, thus providing esthetics for these unfortunate people. The vulcanite dentures are now being resorted to, due to the disappointments of the celluloid and condensite materials. These vulcanite replacements need a narrow strip of natural appearing gum portion. The section may be cut out of the wax set-up, stone or plaster flowed into this box and platinum burnished to the negative. The sides of the platinum pan may be bent in to form undercuts when baked, then the vulcanite will hold this gum section firmly in place.

#### FULL DENTURES

The continuous gum denture should not be made, except for the wealthy, because of the danger of breakage. It is not so difficult to make as it would appear, but calls for a special muffle and oxyhydrogen apparatus for soldering the teeth and rim on the platinum base. The continuous gum denture is the acme of full denture restorations.



# STAINING

Staining artificial teeth is becoming quite an art. Denture teeth stained with 1600° F. stains and glazed with a low glaze, give a most beautiful result. The little markings, irregularities, chalky spots, dentin and enamel checks, brown spots, etc., may be faithfully reproduced. There is a glaze and staining technic on the market which if followed faithfully produces wonderful results. Dr. Pilkington of Detroit gives some very good ideas on staining in an article in the *Journal of the American Dental Association*, July, 1930.

# RESISTS WEAR

Denture teeth are so abrasive that they wear right through gold crowns, inlays, and the enamel cap of opposing natural teeth. Large restorations with bulk, if made of porcelain, resist this wear.

# OPENING THE BITE

Complete restoration of all the teeth or just the visible ones, by the use of porcelain jackets, is recommended as ideal in opening the bite. Appearance, health of the tissues, lack of shock to the teeth and complete protection are the main reasons for selecting porcelain.

There are many points left out of this paper, but possibly some of these given will be of help to you in your ceramic work. If we could lift the veil of the future, I am sure we would find a much greater demand for this ideal restorative material, so it behooves us now to prepare ourselves for that demand.

## DR. WALKER'S EXAMINATION

### CLASSIFICATION

ALFRED WALKER, D.D.S., NEW YORK, N. Y.

*Type 1.* (Minimum requirements for a complete examination.)

Good light is essential, either daylight or artificial light.

Food debris and all kinds of deposits shall have been removed from the exposed surfaces of the teeth.

Tooth surfaces must be dry when subjected to examination. Compressed air should be used and dryness maintained by use of cotton, napkins or rubber dam.

Direct magnification should be employed by the use of Beebe binocular-loupe.

Suitably designed explorers should be used, having points not coarser than 36-gage B & S standard, i. e., must definitely catch in gage 36 Brown & Sharpe standard wire gage or its equivalent.

X-ray pictures should be taken for the detection of interproximal caries in all cases where interproximal surfaces are not plainly visible.

*Type 2.* Good light is essential, either daylight or artificial.

Food debris and all kinds of deposits shall have been removed from the exposed surfaces of the teeth.

Tooth surfaces must be dry when subjected to examination. Dryness may be secured and maintained by compressed air, napkins or cotton.

Magnification.

Explorers must conform with the requirements in Type 1.

*Type 3.* Good light is essential, either daylight or artificial.

Any or all of the following: Mouth mirror (free of blemishes on surface or mirror backing); tongue depressor; explorers which may or may not conform with the requirements of explorers in Types 1 and 2.

Type 1 outlines the minimum requirements for complete examination for the detection of caries.

Type 2 is an attempt to outline the minimum requirements for groups in the school or clinic where, because of lack of facilities or time, it is not possible to make the complete examination as provided for in Type 1 but where the services of the dental hygienist are available.

The Type 3 examination provides for the procedure where large groups are examined and where for lack of time and facilities the examination must of necessity be incomplete.

When reports are submitted for publication, they should state whether the results are based on Type 1, 2 or 3 examination.

This outline for mouth examination for the detection of dental caries is based on present knowledge. Contemporary and future investigations may suggest changes.

## DEPARTMENT OF ORAL SURGERY, ORAL PATHOLOGY AND SURGICAL ORTHODONTIA

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### TYPES OF CHRONIC INFECTION ABOUT THE MOUTH\*

JAMES BARRETT BROWN, M.D., F.A.C.S., ST. LOUIS, MO.

IN PREVIOUS papers from this service we have reported observations on infections about the jaws and mouth, and have tried to emphasize the importance of diagnosis and of treatment of these conditions as they appear in an oral surgical clinic.<sup>1-8</sup> Perhaps as many different lesions can occur in these regions as in any place in the body, but complete examination of the mouth can be readily carried out, and, with a careful study, the great majority of lesions should be correctly diagnosed. It is safe to say that the average patient with an undiagnosed or uncured lesion about the mouth has not had a careful and complete examination and consideration of the findings made. In some instances the lesion may go unrecognized or uncured, but this fact should be taken as an impetus to a close cooperation of dentist—oral surgeon—bacteriologist—internist and pathologist.

*Luetic infections* occur with enough frequency about the mouth to keep one on the alert for them if for no other reason than self-protection. It is probable that the lesions of the first stage, chancre; second stage, mucous patches; and third stage, gumma, are all infectious and especially dangerous for the innocent contraction of the disease by others.

*First Stage Lesion—Chancre.*—The patient shown in Fig. 1 presented a hard, indurated, reddened swelling with a dirty superficial ulceration in the center of the upper lip. The lesion was too large, too much indurated, of too rapid development, and had too much surrounding cellulitis to be considered a carcinoma. The patient was a young married man with a healthy wife and children, and gave no history of possible venereal exposure; however, his Wassermann reaction was positive, and the lesion rapidly subsided when antiluetic treatment was given. The exact nature of the original contamination was not determined.

*A third stage lesion* is shown in Fig. 2 A. This is a widespread, punched-out, irregular ulcer with a very dirty base, and somewhat rolled edges. It has destroyed the full thickness of the cheek and causes a great deal of discomfort. The points against its being carcinoma are too rapid progress, extreme raggedness and dirtiness of the base, a total destruction of tissue without any evidence of excessive growth and too much adjacent cellulitis. The Wassermann reaction was positive. The patient, as the previous one, was not aware of the fact that he had syphilis, and, as this is recognized as a third stage lesion, it is seen that he had gone entirely

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\*From the Service of Dr. V. P. Blair, Department of Surgery, Washington University School of Medicine, and the Oral Surgical Clinic, Washington University School of Dentistry, St. Louis.

through the primary and secondary stages without treatment and without protecting others.

Fig. 2 *B* shows the complete healing that occurred very shortly after active treatment was started.



Fig. 1.—Primary lesion of syphilis (chancre).



Fig. 2.—*A*, Third stage lesion of syphilis in a patient who has had no treatment at all. There is a good deal of surrounding cellulitis and associated lymphadenopathy. *B*, Complete healing that occurred rapidly after active treatment was started.

In the treatment of luetic infections and resultant lesions, there are several points of great importance for all doctors and dentists to remember even though they themselves may never actually administer treatment. (1) Early adequate



treatment will prevent third stage lesions and will to a large extent prevent neurologic lesions. (2) Even a small amount of treatment may possibly prevent late lesions, and treatment in some form or other should always be urged. (3) Third stage lesions such as shown in Fig. 2 A heal very rapidly when treatment is given, and even one injection of salvarsan may effect healing of local skin lesions. (4) The first doctor or dentist who makes the diagnosis of syphilis in a patient should make it his responsibility to see that the patient receives treatment from a competent source. (5) Carcinoma of the mouth frequently occurs in luetic patients, and it should not be overlooked while treating the specific infection. Luetic lesions should heal promptly under treatment; carcinoma will not; and any lesion that persists more than three to four weeks after treatment has been started should be thoroughly investigated.

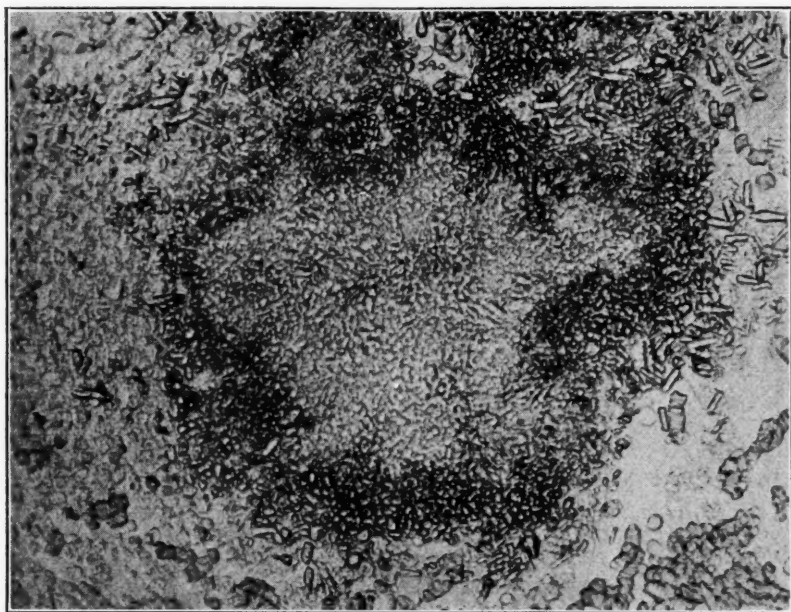


Fig. 3.—Fresh specimen from patient shown in Fig. 4 with actinomycosis. Small "sulphur granules" were seen grossly, but as shown here too much free blood was allowed to mix with the material to obtain a clear photomicrograph. (Dr. Ralph S. Muckenfuss, Bacteriologist, Dept. Internal Medicine, Washington University School of Medicine).

*Actinomycoses.*—The occurrence of this disease is limited in most clinics, but in the study of a total series seen over a period of years many interesting facts have been found. (1) Of first importance is the diagnosis: very close gross observation should be made for sulphur granules of the discharge of all suspicious cases. It is preferable to open a fresh abscess or sinus right in the bacteriology laboratory or to take material there immediately after it is collected. If actinomyces are found on the fresh smear, cultures are not necessary except for further study and identification of other organisms present. The failure to find actinomyces at one examination is not proof against the existence of the disease; in one of our worst cases the true nature of it was masked by a widespread secondary infection, and the organisms were not found until a third drainage was done. Fig. 3 shows a fresh smear from the patient shown in Fig. 4; there are many surrounding red blood cells that indicate that it is best to get the discharge for examination with as little gross blood

as possible. The clinical diagnosis is difficult if there is excessive secondary infection and if there is no history of farm life or possible contamination from animals. However, the chronic course of the disease refractile to simple drainage should make one suspicious, and the finding of the actinomyces is so important that this might be made part of the clinical diagnosis. The main method of inoculation is probably from chewing on contaminated straws or grass, but we observed three consecutive cases in chauffeurs. The patient shown in Fig. 4 offers as good a clinical picture as possible.

(2) The method of spread of the disease is peculiar in that one is likely to think of it as being in the bone—and it may even get access to the tissues through carious teeth—but there is seldom any direct bone involvement; and there is not even much associated lymph adenopathy. The process appears to be along fascia and muscle. Secondary infection about the bone is, of course, common, and we have recovered

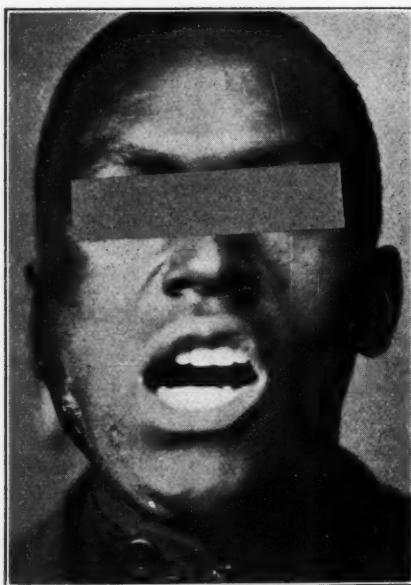


Fig. 4.—This patient had a typical history of multiple abscesses of the cheek that were opened and no examination of the pus was made. About fifteen scars and draining sinuses are present, and there is limitation of opening of the mouth. The diagnosis in this case should have been made on purely clinical findings without demonstration of actinomyces.

actinomyces from an abscess of the temporomandibular joint and zygomatic fossa, but we have not seen a true block necrosis of the jaw as a result of this infection. The inability of the patient in Fig. 2 B to open the mouth is evidence of infiltration and fibrosis of the muscles and other soft parts.

(3) Although it does not occupy a very prominent place in most descriptions of the disease, there is a marked tendency to the formation of fibrous tissue. We have found this so marked in several patients that a permanent cure did not result until a wide dissection of the fibrous tissue was done. One patient who had very excessive scar tissue over a large area centered around the angle of the jaw had had sinuses draining from it for twelve years, and at that time his doctor had told him that the area would never heal. We did not recover actinomyces from his

wounds, but there was complete healing following a wide dissection of the scar tissue, and it is thought that it was possibly the result of actinomycosis.

(4) Involvement of the nerve trunks and meninges may occur in uncontrolled cases. In one fatal case of temporomandibular joint infection and osteomyelitis we did not recognize the disease until actinomyces were found in the meninges at autopsy. The symptom of the nerve trunk involvement is severe pain, much the same as encountered in some cases of buccal carcinoma.

(5) In the treatment of this disease large doses of potassium iodide are almost universally advocated. We have gotten the dose over 480 grains in a day, but we are not certain that there is any definite action of the drug on the organisms. If severe iodism occurs, the dosage has to be stopped or cut down. One patient on this service had violent headaches when taking it but no skin eruption.

Surgical drainage should be done of all areas containing pus and the tracts maintained open. This may mean entry into the temporomandibular joint or zygomatic fossa.

X-ray therapy is given routinely on this service by Dr. Sherwood Moore, and we believe now that it is perhaps the best single element in the entire treatment.

Dissection of excessive amounts of scar tissue after it is thought that the disease is controlled may be necessary before complete and permanent healing is attained.

A preparation of lymph glands has been advocated for use in actinomycosis because of the fact that the glands themselves are rarely involved in the disease process, and it is thought that there might be some specific anti-infectious agent present.

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(To be continued)

## HEMANGIOMA, LYMPHANGIOMA, AND RANULA

(LESIONS OF THE ORAL CAVITY AND OF THE JAWS AND THE REGION OF THE JAWS,  
INCLUDING THE TEMPORAL FOSSA, ORBITAL CAVITY, AND SINUSES)\*

JOSEPH COLT BLOODGOOD, M.D., BALTIMORE, MD.

(Continued from page 1223)

### HEMANGIOMA

MINUTE angiomas are most frequently seen on the floor of the mouth and on the under surface of the tongue where there is the greatest venous circulation. In some instances there is almost a varicosity in this region of the oral cavity. These little blue subepidermal tumors, which are always compressible,

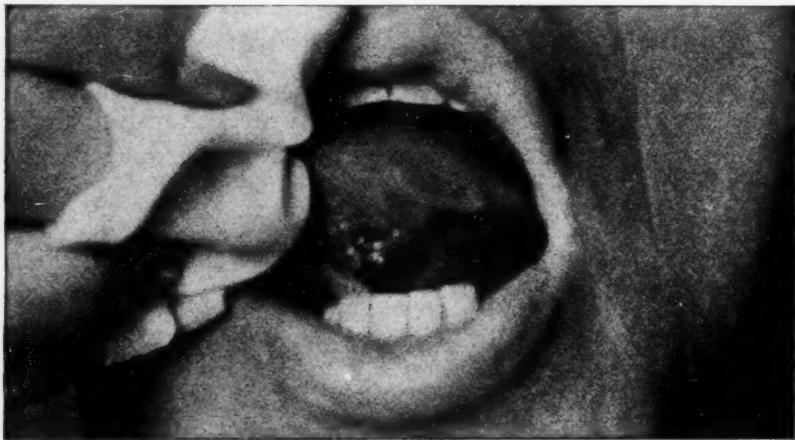


Fig. 42.—Pathol. No. 37412. Hemangioma. Photograph taken in 1925. Result in 1928, well. The patient, aged thirty-one years, first noticed intermittent swelling twelve years ago. The definite tumor seen in the photograph has been present four years.

may be present anywhere in the mouth, but rarely are they large enough to justify removal. Now and then, when situated on the cheek or tongue, where they may be irritated by the teeth or even injured by biting, it is best to excise them. We have recently removed one from the base of the tongue.

Now and then the angioma may reach a large size. Figs. 43, 44, and 45 illustrate such an example. This tumor was excised under novocain with the cautery in 1925, and the patient tells me that she talks better and there is very little visible deformity. There is no recurrence in 1928. At the operation we cut through normal tongue tissue.

I shall not discuss or illustrate the huge congenital hemangioma that involves the cheek, invades the mucous membrane of the mouth, extends into the tonsil

\*One of a series of articles by Dr. Bloodgood that will appear in the JOURNAL over a period of eighteen months to two years. Originally published in *Lewis' Practice of Surgery*, W. F. Prior Company, Inc., and brought up to date.



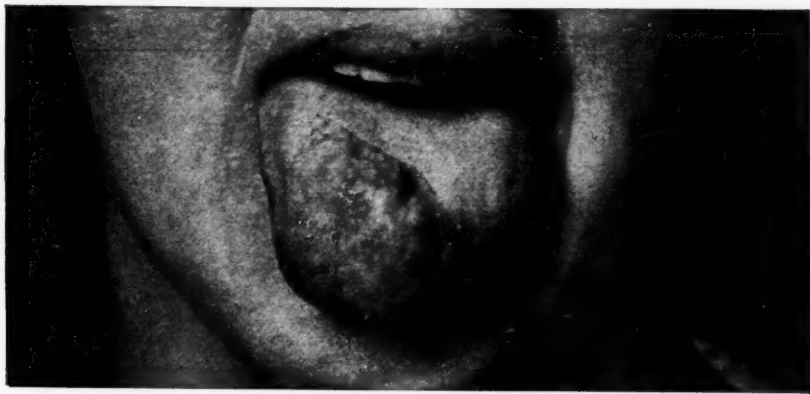


Fig. 43.—Pathol. No. 37052. Angioma of the tongue present at birth, slowly getting larger. One year x-ray treatment checked growth, but did not diminish size.

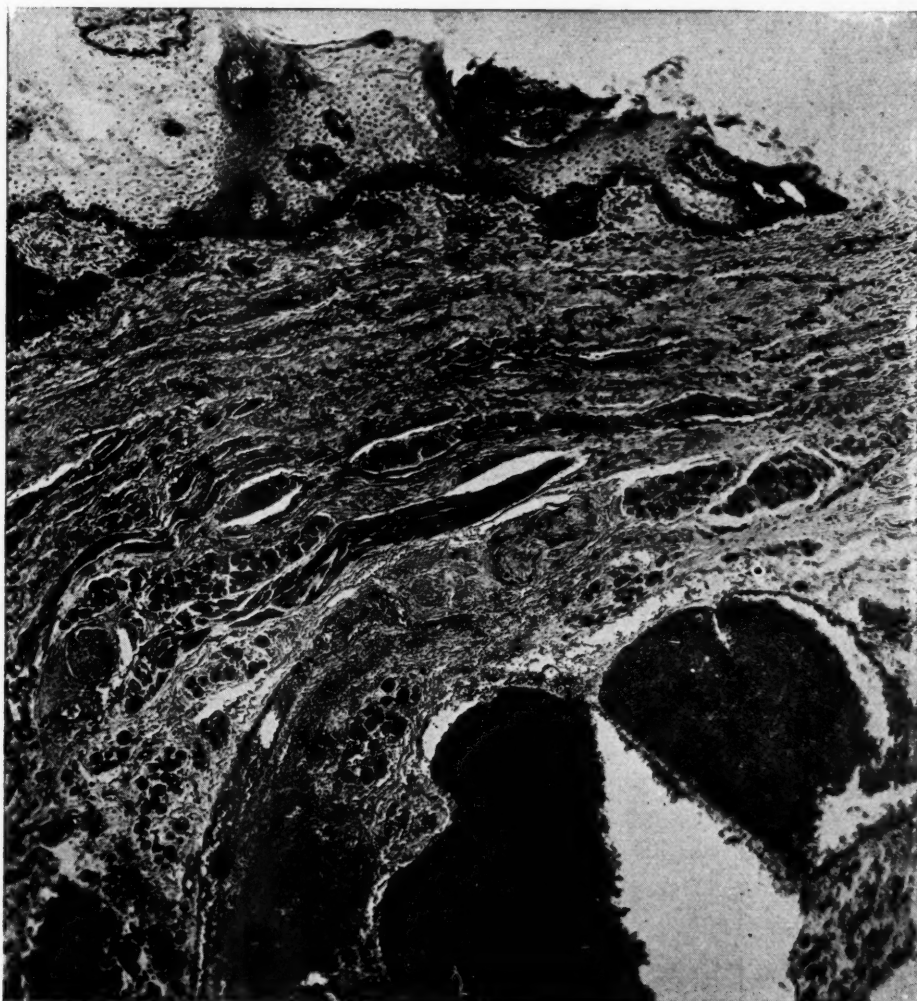


Fig. 44.—Pathol. No. 37052. Photograph of hemangioma excised from the tongue shown in Fig. 43. One can see the spongy submucous tumor with a zone of muscle beneath. Operation in 1925. The patient is well in 1928.

and pharynx, or may invade the orbit. I have recently had one involving the tonsil and pharynx. Ligation of both external carotids followed by x-ray treatment has arrested the growth. It is much smaller one year since observation.

#### LYMPHANGIOMA

Lymphangioma occurs as a minute tumor and is recognized only in the microscopic section. The tumor is most common on the dorsum of the tongue where cancer does not occur. Lymphangioma of the lip (macrochylia) and of the tongue (macroglossia) are rare conditions, usually congenital. If radiation fails

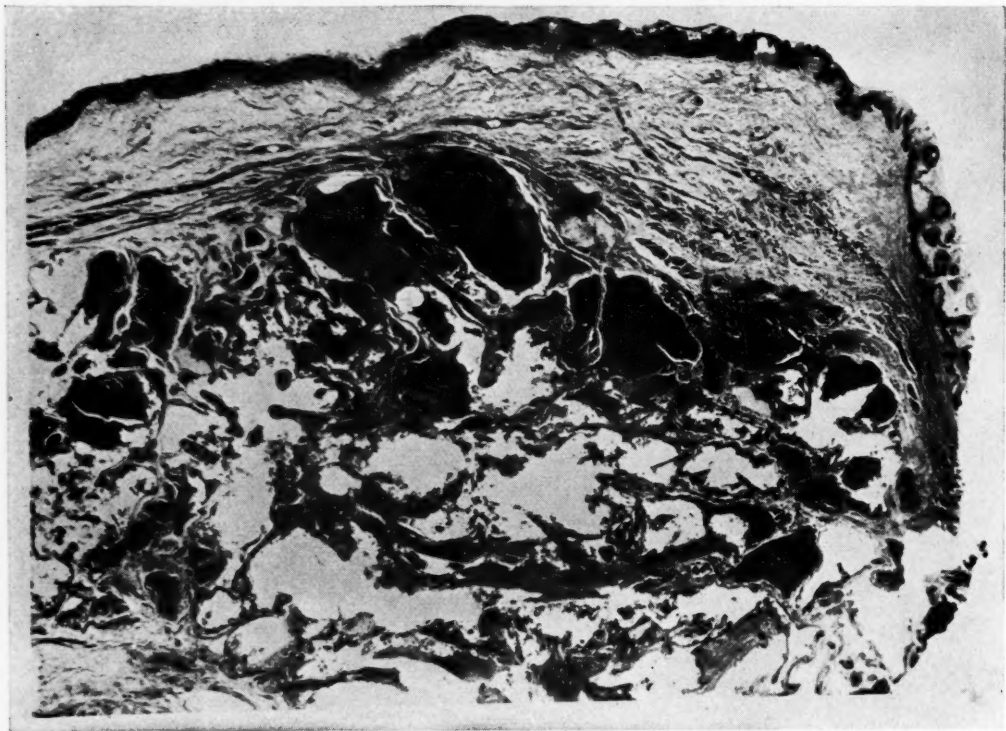


Fig. 45.—Pathol. No. 37052. Photograph of entire microscopic section of tumor shown in Fig. 44.

to check the growth, excision with the cautery usually accomplishes a cure. In operating upon a lymphangioma there is not the danger of hemorrhage as in operations upon hemangioma. When a hemangioma cannot be completely excised by cutting through uninvolved tissue and partial excision is indicated as an operation of necessity, there should first be ligation of the external carotid artery, then radiation, then coagulation, then the introduction of the electric cautery—all attempts to obliterate the blood spaces and convert the hemangioma into fibro-hemangioma before attempting excision.

#### RANULA

This lesion is so fully described in the old text books on surgery and is such a rare lesion of the mouth and so easily dealt with that it seems unnecessary to take much space. My first patient with ranula, operated on in 1899, returned under observation in 1928 with a lesion of the prostate. The scar in the mouth

through which the ranula was excised was hardly visible. Some ranulae can be completely excised, because they are cysts of glands which have no connection with sublingual or salivary glands. But in the operation one must be careful not to injure the ducts to the sublingual and submaxillary glands. If either duct is injured, it must be sutured into the mucous membrane wound. If the ranula is due to the dilatation of one of these ducts, there must be partial resection with a plastic operation to restore the continuity of the duct. Recurrent ranulae were observed only when the first operation was incomplete or improper.

Fig. 46 is an excellent recent photograph of a ranula operated on January, 1928. It had a smooth wall, contained clear fluid, apparently was not connected with the exit duct of the sublingual or submaxillary glands. There has been no recurrence up to July, 1928, eighteen months after operation.

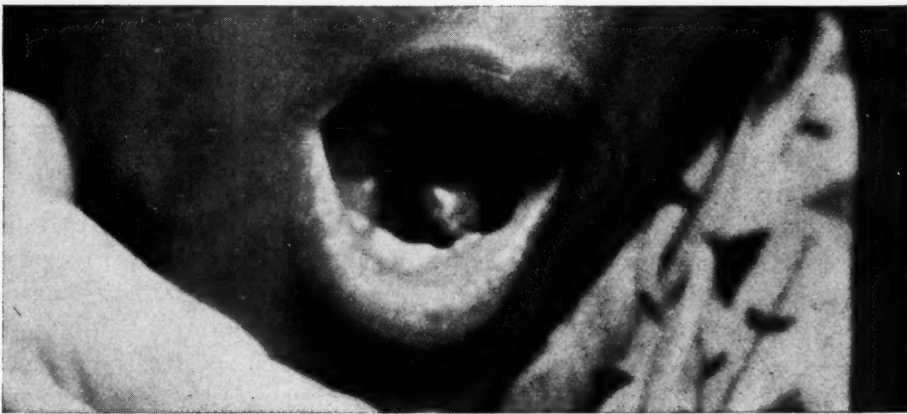


Fig. 46.—Pathol. No. 40036. Photograph of patient showing a typical ranula of the mouth of a few months' duration. No etiologic factors found.

#### APPENDIX

All of the hemangiomas observed up to the date on which the above was written, 1928, have not recurred. We have had a few new examples of lymphangioma but have not changed our diagnostic methods or treatment. The most interesting feature today of lesions of the oral cavity is that the majority of the lesions we see are not cancer. Many have no relation to cancer. Many are the type that precede cancer. From the standpoint of diagnosis and treatment they are more difficult to handle sometimes than cancer, but of course the results are better.

There is no doubt but that educational efforts are bringing more people under the observation of the dentists and physicians in the stages that precede cancer or in the earliest stages of cancer. The difficult thing today is to choose what should be the first treatment, surgery or irradiation. Another difficult thing is the decision as to biopsy. As to biopsy in tumors, I refer to Dr. C. Alexander Hellwig's article in the *Archives of Pathology*, 13: 607, 1932. Dentists and oral surgeons should read this résumé.

(To be continued)

## FOCAL INFECTION IN ARTHRITIS AND RHEUMATIC AFFECTIONS

JOHN D. CURRENCE, M.D., NEW YORK, N. Y.

**A** RTHRITIS and chronic rheumatic disease represent a group in which the physician and the dentist most frequently must cooperate for the welfare of the patient. It is estimated that over 2 per cent of our population suffers from some form of chronic rheumatic disease. Chronic rheumatic disease is the most frequent cause of human disability from illness. It has been estimated that its occurrence is twice as common as heart disease, six times as common as tuberculosis, and fifteen times as common as cancer.

Unfortunately this field has not enjoyed large contributions for research, and its diagnosis and treatment will undoubtedly reach a much higher plane as a result of the present awakening interest.

Results have proved that the basic principle of eliminating foci of infection is sound and should be continued. Various authorities disagree on the relative importance of specific foci in chronic rheumatic disease, but the general consensus of opinion is that after young adult life is passed, dental infection probably represents the greatest single factor in focal infection.

Infected teeth found either by dental examination or by x-ray examination should be removed. Devitalized teeth that have been infected and from which the dental pulp was removed and replaced by a filling may appear innocent to x-ray examination, but myriads of bacteria are often found in and about their roots. Pyorrhea, if present, must be eliminated by vigorous treatment.

Even when all the teeth are out, x-ray pictures should be taken for concealed roots, broken off during dental extraction. Such roots are often found in a pool of infection. The dentist should remove every possible dental focus, but the extraction of normal teeth on a doctor's dictum that "the teeth should come out" should never occur. Infection about the roots of normal vital teeth is so rare that their removal is practically never justified.

In caring for large numbers of rheumatic cases, it has been my observation that teeth should not be pulled during an acute exacerbation of the rheumatic condition, nor should more than two or three be removed at one time. If these precautions are followed, serious set-backs seldom occur, but I have frequently observed patients who were able to walk to the dentist's office but following the wholesale removal of infected teeth suffered acute flare-ups of the disease, which kept them in bed for months.

It is well to explain to the patient the degree of infection found in dental foci, but it is better not to promise a cure simply because serious dental foci are removed. I have known numerous instances where overenthusiastic dentists, after removing badly infected teeth, assured patients of recovery. These patients failed to continue under proper medical care and because removal of dental foci did not bring a cure, they attempted to dissuade their friends and acquaintances



from having proper dental care. Even though the dental infection may have been the primary cause of the disease, frequently by the time the dental foci are removed the infection has become so widespread in the system that many other factors must be considered and treated before the desired result can be accomplished.

Conclusions were drawn from observations in the clinic of the New York Post-Graduate Hospital and Medical School Division of Columbia University as well as from private office practice and the institutional care of patients in the arthritis department at the Hotel New Yorker.

## TECHNIC FOR THE REMOVAL OF A BROKEN NEEDLE IN THE REGION OF THE POSTERIOR PALATINE CANAL

M. FRANCIS WIELAGE, D.D.S., MIAMI, FLA.

OCCASIONALLY a needle is broken in the region of the posterior palatine canal, especially in children. It generally is found under the periosteum. The mode of approach is somewhat different from that which is followed when a needle is broken in the region of the mental, infraorbital or inferior dental foramen.

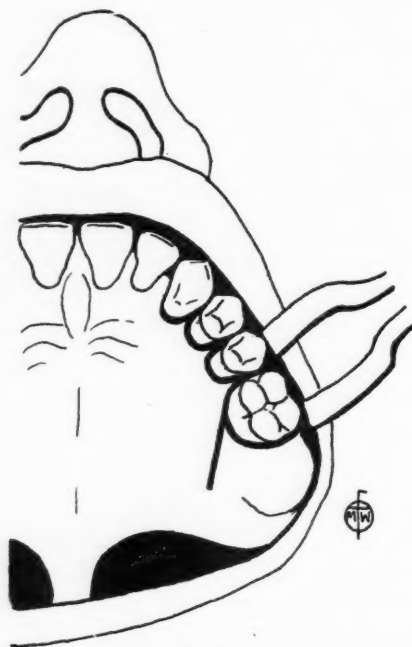


Fig. 1

The tissues of the palate are more fibrous and less elastic, consequently it becomes necessary to enlarge the incision to the incisal region if access is to be had for the removal of a needle. Fig. 1 illustrates a modification of the customary incision; Fig. 2, the flaps retracted; and Fig. 3, the closing of the incision with one suture. This is followed by a pack pressing against the palate for one-half hour.

The drawings represent the mouth of an eight-year old girl; consequently the second molar is not yet erupted. For older individuals the palatal incision is carried to the second molar. The location of the posterior palatine foramen is midway between the median line and the linguogingival margin of the third molar in adults and of the second molar area in children, and from 3 to 6 mm. anteriorly of the junction of hard and soft palates.

The length of the palatal incision is governed therefore by the location of the posterior palatine foramen, which very often is recognized by a depression in the mucous membrane.

The course of the anterior palatine nerve, artery, and vein is anteriorly from the posterior palatal canal in a definite groove.

Proper instrumentation and assistance is paramount. General anesthetic is to be preferred in children, with the addition of 0.5 c.c. of 2 per cent novocain suprarenin solution injected in the region of the foramen when the surgical stage is reached to secure a more bloodless field.

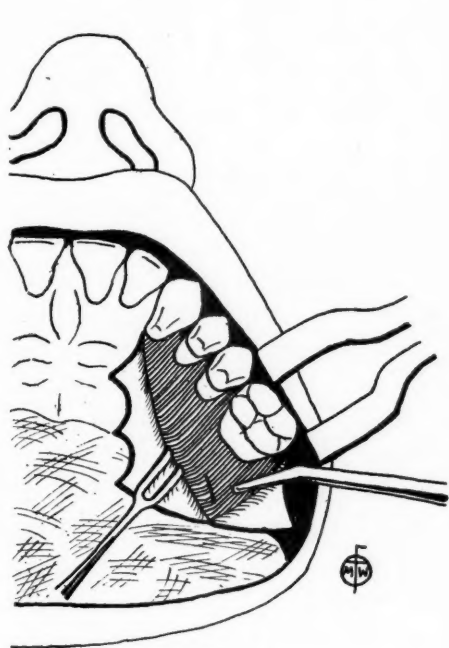


Fig. 2

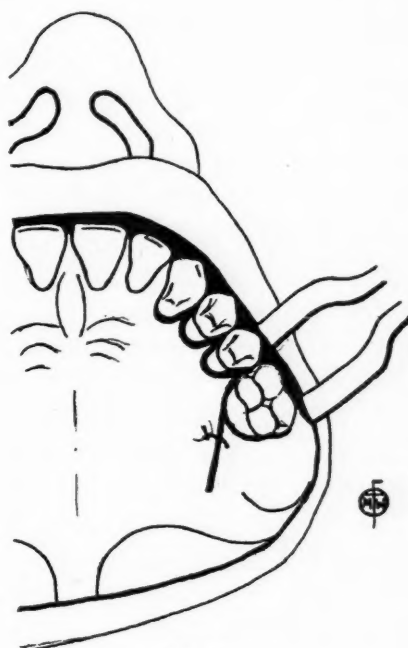


Fig. 3

The incision is carried to the mucoperiosteum and the flaps are retracted, Fig. 2. Careful handling of the suction apparatus is necessary. After location and removal of the needle, the area of operation is flooded with hexylresorcinol solution S.T.37; after which one suture is placed in the palatine incision. A gauze pack under pressure is placed against the palate for one-half hour. Recovery is uneventful.

It is here suggested that the injection for the anterior palatine nerve in the region of the posterior palatine canal is made perpendicular to the palatal surface in that region, rather than to inject partly parallel to the linguoalveolar plate.

## DEPARTMENT OF RADIOGRAPHY

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### OCCLUSAL OR HORIZONTAL RADIOGRAPHY AS SIMPLIFIED BY A NEW COMPACT AND PRACTICAL MOUTH CASSETTE\*

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A COMPREHENSIVE SURVEY OF THE STATUS OF THIS PHASE OF RADIODONTIA,  
ANALYZING ITS VALUE, STATING ITS DIFFERENTIATIONS, EMPHASIZING ITS  
APPLICABILITY, AND SIMPLIFYING AND STANDARDIZING ITS TECHNIC  
WITH THE DENTAL X-RAY UNITS COMMONLY USED

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J. BEN GOLDSMITH, D.M.D., NEW YORK, N. Y.

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IT BECAME obvious to me some time prior to the publication of my study on "Canine Impactions,"<sup>3</sup> that the true occlusal aspect or horizontal projection of the occlusal surfaces of the teeth was invaluable in many instances and absolutely indispensable to the correct and conclusive localization of unerupted, malposed, or impacted teeth.

In following up this thought it also became evident that dental radiography confines itself almost wholly to intra- or extraoral studies of the vertical or oblique positions of the teeth. Horizontal studies which afford a survey of both mesiodistal and buccolingual positions have been made thus far but rarely. A review of the literature discloses nowhere an adequate or practical radiographic technic for its execution. The so-called occlusal view taken with the tube at a sharp angle over the nasion is an oblique or pseudo-occlusal view, and not a horizontal view; and the method often employed to obtain the true occlusal views is looked upon as being something of a stunt and is hardly practical.

As a whole the textbooks on radiodontia<sup>2, 4, 5, 8</sup> provide scant information on this subject with the exception of Simpson<sup>5</sup> who treats the matter comprehensively, although the technic described in his book is neither practicable nor feasible for the average office that is equipped with the regular dental x-ray unit. But in a later publication and in response to communications from myself and others, Dr. Simpson<sup>6</sup> described a cardboard intraoral holder for taking occlusal views with the dental unit. More recently, a similar makeshift was described by Voorhees.<sup>9</sup> Both of these devices unfortunately were not very satisfactory in my hands for reasons to be stated later, and led to the development of a compact intraoral cassette made of metal that makes the technic of occlusal or horizontal exposures as simple as routine intraoral radiography.

Those who have had any extended experience with the localization of impacted or unerupted teeth will probably agree with the statement emphasized before, elsewhere,<sup>3</sup> that it is virtually impossible to determine the exact and definite position

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\*Presented as demonstration and clinic at the meeting of the Harvard Alumni Association, Harvard Dental School, Boston, Mass., April 8, 1932, and at the Thirty-First Annual Meeting of the American Society of Orthodontists, Toronto, Canada, May 19, 1932.



of these teeth with the vertical or oblique radiographs alone. No matter how carefully correlated, and studied from the several positions and angles, there remains in this manner of determining their accurate location an appreciable amount of indecision and guesswork.

The basis for determining with vertical or oblique radiographs whether these teeth present lingually or labially, that is, whether the crowns of the teeth are in the lesser or greater curvature of the arch, is surrounded by several theoretical considerations which make the proposition a problem whose solution is fraught with reservation and doubt.

It is presumed that of two teeth in close apposition, the one closer to the film will present the clearer delineation when its superimposed image on the radiograph is studied. Light varies inversely as the square of the distances; so it may be assumed that the definition and clearness of the images projected upon a film vary accordingly as their distances from the film. This consideration, however, would be reliable if the involved teeth were a good distance apart, an inch or more perhaps, but it is most confusing where the teeth are contiguous and their axial inclinations vary. Experience has taught that a conclusion on this basis is hazardous.

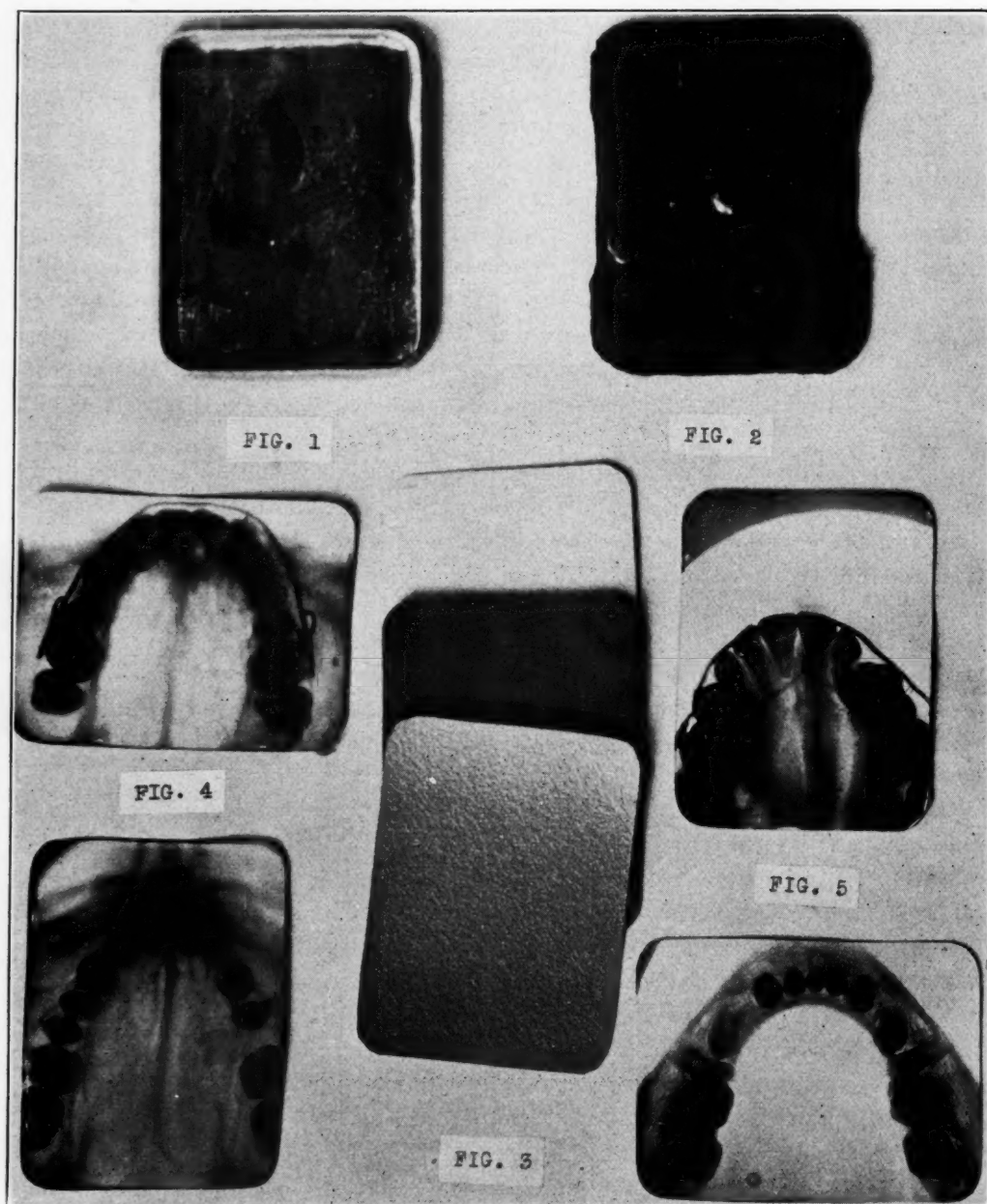
The second method is that of taking views by shifting the tube laterally in the horizontal plane on either side of the area under consideration by the so-called "shift-sketch" method described by Raper,<sup>4</sup> who states that if the shadow of the unerupted tooth moves in the direction in which the tube is shifted, that unerupted tooth is lingual. This method, while sound in principle, is too involved and too confusing, and, as indicated above, is fraught with possibility of error in interpretation due to the contiguity or close proximity of the teeth under consideration, to say nothing of the difficulty often involved in obtaining satisfactory radiographs at the varying angles, and of similar density. Besides, this inferential conclusion gives no relative picture of depth.

There remains of course the stereoscopic method which need not be discussed here because its technic is entirely too exacting and involved. A special viewing machine, the stereoscope, rather elaborate in character, is required to interpret the findings. Moreover, the stereoscopic picture as noted with the aid of the stereoscope hardly presents the same picture to every individual. Like beauty, much depends on the eye of the beholder. Yet the stereoscope was evolved and put to use primarily, it seems, because it was recognized that a perspective study of the teeth and surrounding structures has a distinct value in radiographic diagnosis.

It is evident that the problem involved in the localization of an unerupted tooth is in reality a geometric proposition of finding the locus of a point within a solid and requires, as we all know, a knowledge of its relative positions in at least two perpendicular planes. To determine definitely the position of such a tooth we must know in addition to its place in the frontal or lateral plane which is disclosed by the vertical view, its position in the horizontal plane which requires an occlusal view. Incidentally, it might be added that because of the complex form of the jaws this latter view is the only other aspect possible which is relatively perpendicular to the usual vertical studies.

In my humble opinion there is but one method that is logical, scientific, and

reliable. It is what Raper calls the "cross-fire" method.<sup>4</sup> It bases its procedure in localization of the position of the unerupted tooth in two planes perpendicular to each other. Dr. Raper argues with characteristic conviction for this method. He says, "The 'cross-fire' method of localization can best be described by taking a



Figs. 1, 2, and 3.—The Goldsmith mouth cassette.

Fig. 1 shows the shallow container of aluminum.

Fig. 2 shows the light-proof cover and the method of clamping the cover to container.

Fig. 3 shows intensifying screens (unmounted) in later machine made model. These are mounted on Figs. 1 and 2 to facilitate handling and prevent dropping in dark room. The film is shown between the active sides of the screens.

Figs. 4 and 5.—Typical results obtained with the use of this cassette with ordinary dental unit as described. Fig. 5 (upper view) is a pseudo-occlusal view as compared with the pictures in Fig. 4, which are true occlusal or horizontal views.

concrete case: Say a bullet in the leg. Two radiographs are made: one with the rays passing through the leg in an anteroposterior direction, the other with the rays passing through the leg in a lateral direction. The radiograph made with

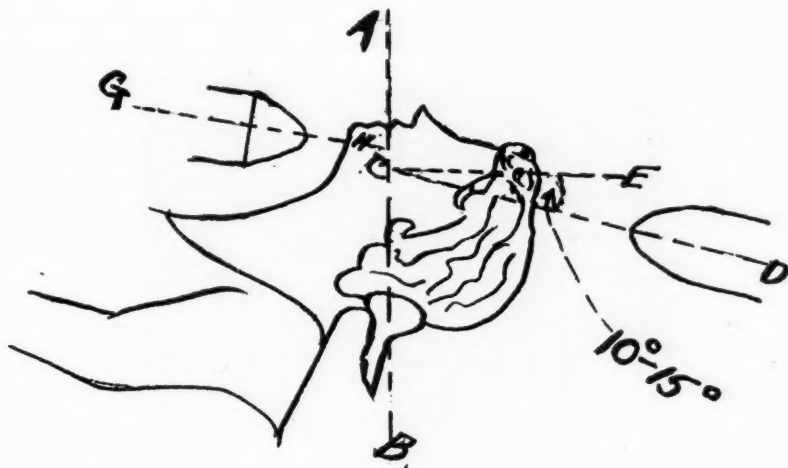


Fig. 6.—Diagrammatic sketch showing position of tube with respect to intraoral cassette. *AB*, plane of cassette held against occlusal surfaces of teeth; *ACD*, angle of tube for maxillary occlusal view; *AHG*, angle of tube for mandibular occlusal view. Target distance in both is 8 inches, or 2 inches from the apex of cone in most dental units. Exposure is four to six seconds for maxillary view and two seconds for mandibular view.

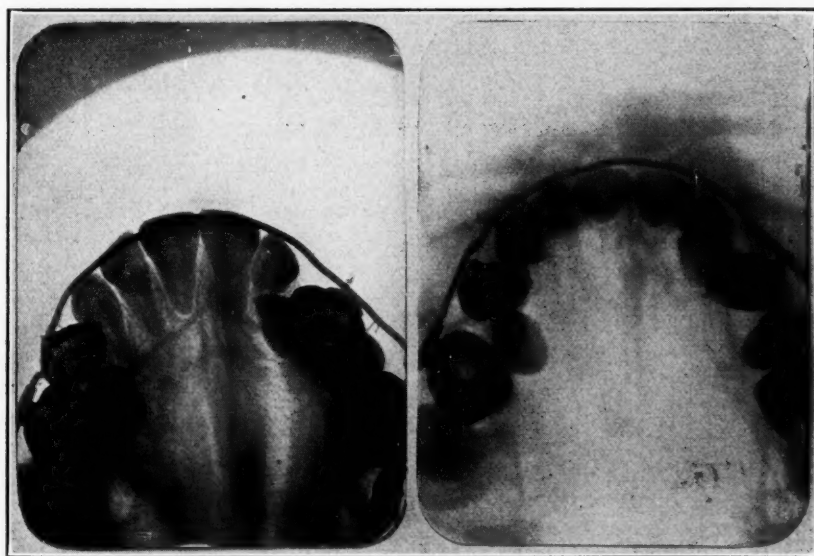


Fig. 7

Fig. 8

Fig. 7.—A pseudo-occlusal or oblique view taken as described. It offers a striking contrast to Fig. 8, a true occlusal radiograph with all the teeth buttonlike in appearance. It is clear that Fig. 8 is the better for localization of the unerupted tooth and for diagnosis as a whole, and for arch form survey.

the rays passing through the leg in an anteroposterior direction gives the lateral (i. e., side to side) location of the bullet, the radiograph made with the rays passing laterally through the leg gives the anteroposterior location of the bullet." Dr. Raper, however, regrets that the drawback to this method is that one requires a

more powerful x-ray tube than the one commonly supplied with dental units and thus refers the problem on to the work on the subject by Dr. Simpson.

And certain it is that the true occlusal radiographs of the maxilla have thus far been obtained even with more powerful x-ray apparatus than the popular dental units, only with considerable difficulty and with the aid of intraoral holders

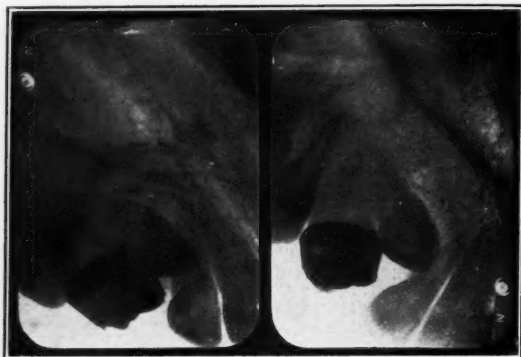


Fig. 9.—Two radiographs taken with tube shifted, according to the shift sketch method. It will be noted that the canine has followed the tube and that the presentation of the tooth is therefore lingual as shown in Fig. 8. There should be no question, however, as to which picture is most convincing.

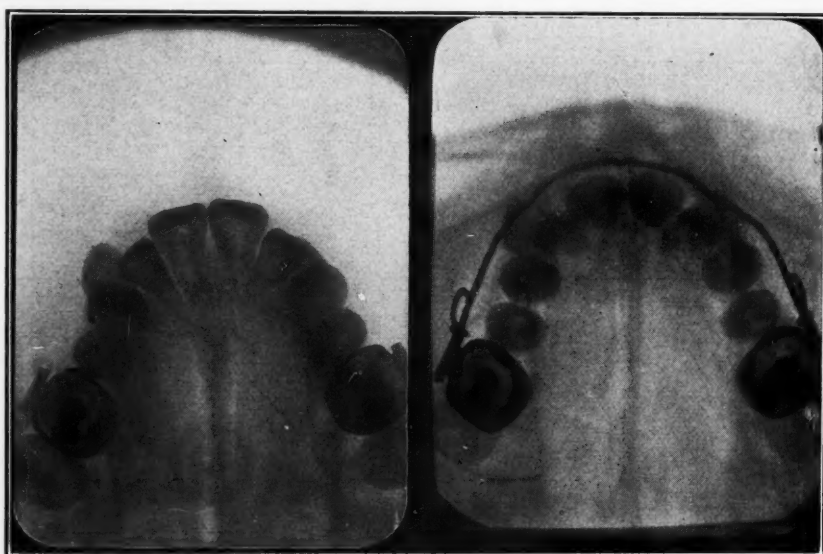


Fig. 10

Fig. 11

Figs. 10 and 11.—Radiographs of the same case with canines in labial impaction. Note that in Fig. 10, an oblique view, the relationship of the canines is not definite, but in Fig. 11, a true occlusal picture, their positional outline is in definite labial presentation. Moreover, Fig. 10 is hardly useful as a record of arch form, but Fig. 11 is accurate and most valuable.

involving the use of intensifying screens holding between them a duplitized film and described by Simpson,<sup>6</sup> as previously stated. However, a study of Simpson's noteworthy contribution in this particular, hardly reveals his method as being practicable. The general principles involved are clearly stressed by the author but his cardboard holder technic for its execution must be completely revised and perfected. His method of confining the intensifying screens and the film in this



holder, which is taped and double wrapped in the dark room requires too much time and care in its preparation and use, and the results obtained are not often satisfactory.

The package so made is held against the occlusal aspects of the teeth, the jaws are closed and exposed as shown in Fig. 1, similar to the method used with the mouth cassette and described in a subsequent paragraph.

When the packet was thus introduced in the mouth and held between the teeth, the result was rarely a good one. The film was often blurred and indistinct at the point of greatest interest, due of course, to the impossibility of securing and maintaining by that method the perfect adaptation of the film and screens in tight and light-proof apposition, which is absolutely imperative in order to obtain uniform results. It is to be noted that the curve of Spee in the maxilla does not allow

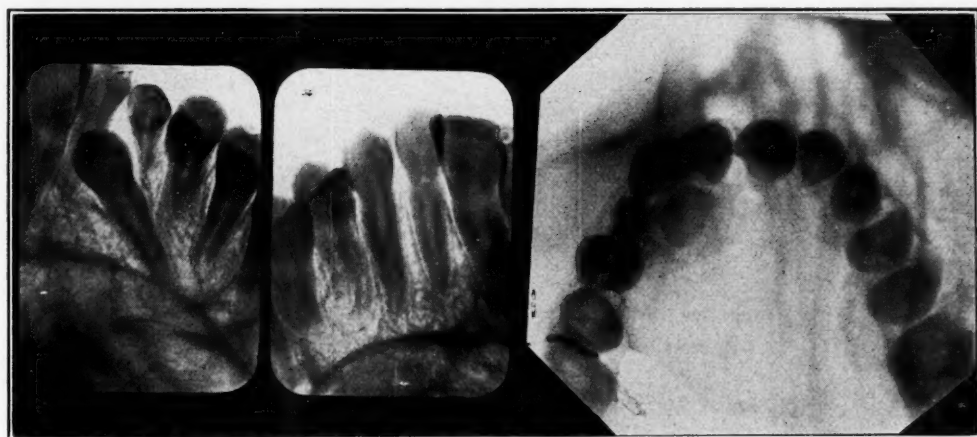


Fig. 12 A

Fig. 12 B

Fig. 13

Fig. 12.—The vertical views of right and left canine areas of case shown in Fig. 13. Fig. 12 A shows the impacted canine nicely with respect to its vertical obliquity, but Fig. 13 clinches the localization for surgical procedure and orthodontic diagnosis and eliminates guesswork.

even contact of teeth on both sides of a bulky package. This causes the package and its contents to bulge and buckle at points of noncontact or pressure. The contact of the teeth here, therefore, cannot be expected to help hold the film and screen in the required apposition.

It was quite clear to me then that an intraoral cassette embodying the following principles should be devised: •

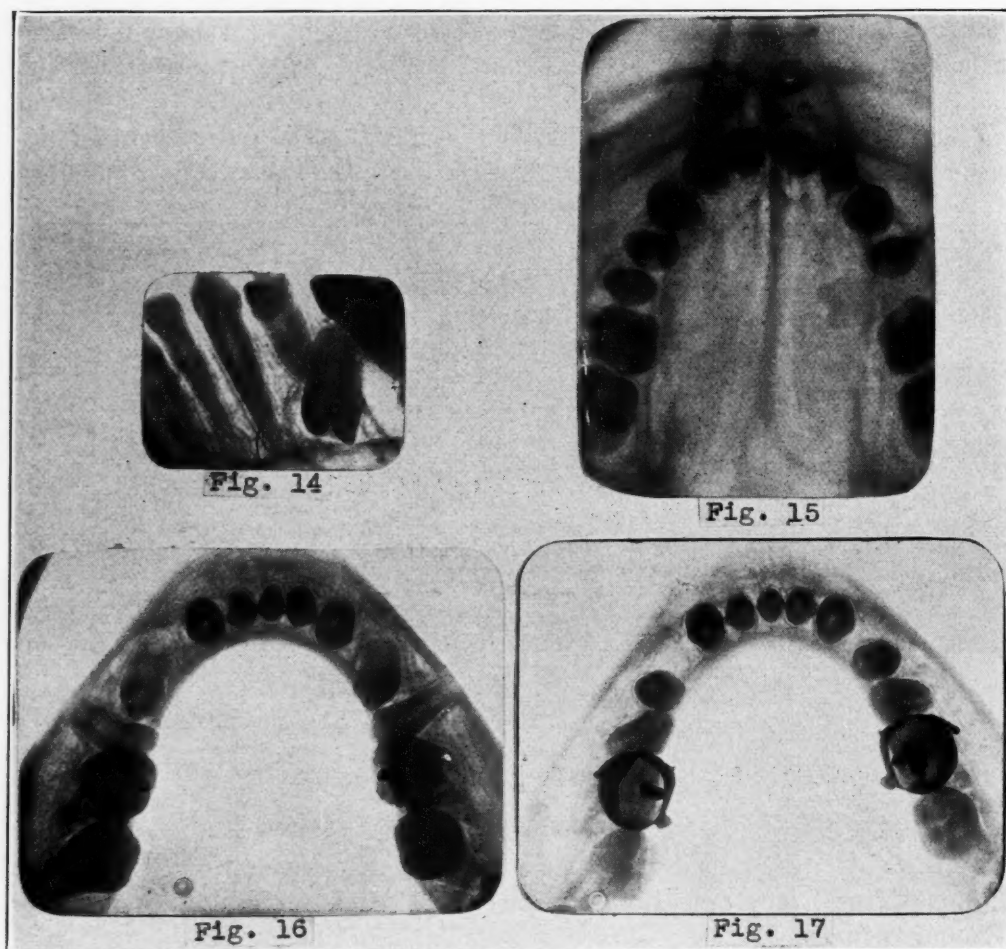
1. Flat and rigid screens against a flat and rigid background.
2. Tight and flat apposition of screens and film held flat.
3. Light-proof container embodying the above and allowing rapid and easy loading and easy manipulation, and of aseptic use in the mouth.

After considerable experimentation with several containers made of different materials, a simple and compact device was finally constructed which meets all the mentioned provisions and which has been found altogether gratifying. It does away entirely with the makeshifts in the earlier holders and produces as are here shown, consistently uniform and satisfactory results, with much less effort.

This cassette as illustrated consists of an outer and an inner portion so made

that it holds when closed two intensifying screens properly mounted and between them a duplitized film,  $3 \times 2\frac{1}{4}$  inches, in tight, flat, and light-proof apposition.

It might be well here to review the essential principle employed in the intensifying screens. They consist of oblongs of cardboard on one side of which has been deposited a precipitate of calcium tungstate which has the property of fluorescing or converting the roentgen rays into ordinary white light. The screens



Figs. 14 and 15.—A somewhat unusual inversion of a premolar whose contrast in position is an object lesson in radiodontic localization. It is to be noted that the vertical view, Fig. 14, is of importance only when correlated with the occlusal view, Fig. 15. A subsequent surgical effort proved the tooth to be in the exact relationship shown in Fig. 15. In such a case it is obvious that the occlusal view is indispensable.

Figs. 16 and 17.—An object lesson in positional relationship. An occlusal study of a mandible with a most interesting anomaly. A congenitally missing incisor and premolars bilaterally unerupted and impacted (Fig. 16). Fig. 17 is the same case a year after surgical and orthodontic treatment.

moreover have the capacity of absorbing a far greater volume of these rays, which is equivalent to increasing their effectiveness many fold, and thereby producing a radiograph of better contrast and sharper definition.<sup>1</sup>

But these screens and films, to repeat, must be in *tight, flat, rigid, and light-proof* apposition. With these principles in mind, the cassette is loaded and inserted in a sterile cellophane envelop. It is then placed in the mouth and held

with opposing posterior teeth and one thumb in anterior portion against the occlusal surfaces of the teeth. The x-ray tube is directed so that its long axis is parallel to the axial inclination of the teeth and about  $15^\circ$  short of being perpendicular to the plane of the cassette. The patient is seated, and the cone is pointed obliquely forward and downward at the middle of the cassette, 8 inches from the target, or 2 inches from the skull, so that the central rays pass through the cranium

Fig. 18

Fig. 19

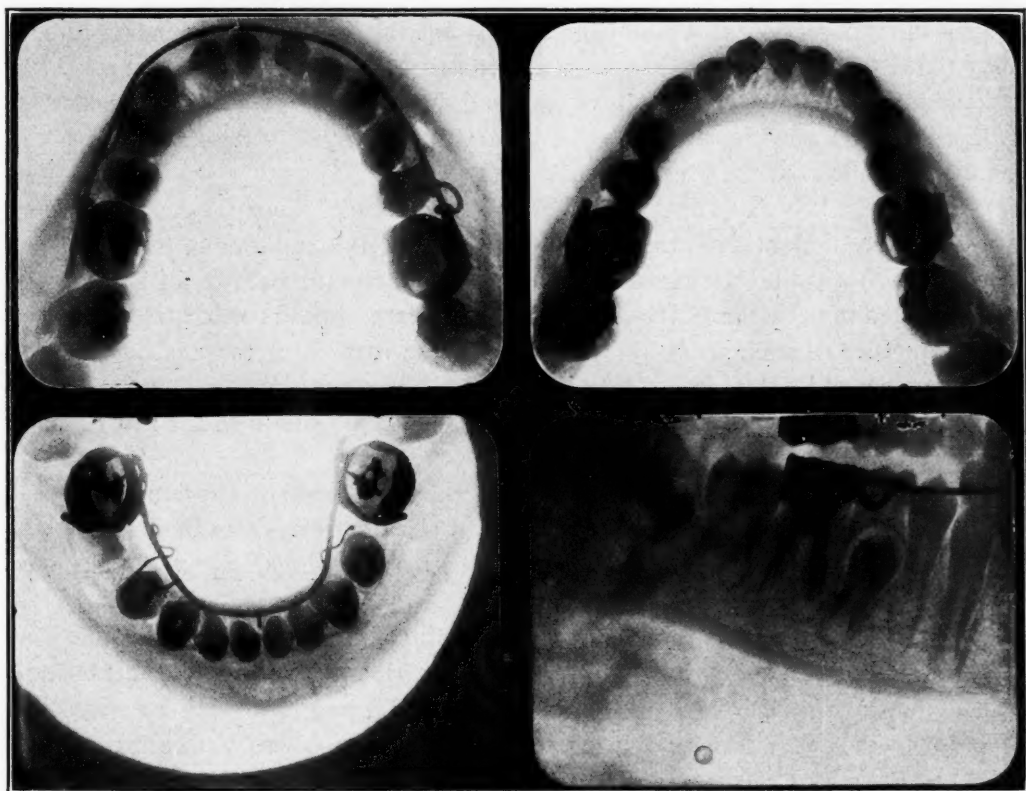


Fig. 20

Fig. 21

Figs. 18 and 19.—A mandibular study of tooth position and arch form before and after treatment. This study would have been more interesting if an occlusal view of this case had been taken before the two supernumerary incisors were extracted. What other views of this case could have presented so graphic a survey of orthodontic treatment and contrast in arch form, etc.?

Fig. 20.—A horizontal radiograph of a mandible showing a congenitally missing left second premolar and in the right the analogous tooth in retarded development. Note the sharp outline of the individual teeth and the root canals shown in cross-section. The position and adjustment of the appliance and its relationship to the case are also strikingly shown.

Fig. 21.—Another helpful use for the cassette. The occlusal film here is used extraorally to check up root canal work in a small child where gagging made a small intraoral exposure impossible after several attempts. This was taken with an exposure of two seconds and with no trouble to patient or operator. The result is a valuable record of that entire portion of the developing part and the teeth in process of eruption and development. It also suggests the wider use of this mouth cassette for extraoral application when we realize how helpful it is to obtain such radiographs in restless and playful children with a minimum exposure.

for an exposure of four to six seconds (Fig. 6). The cassette fits lengthwise in children's mouths and breadthwise in adults' mouths.

The cassette is then removed from the mouth, unloaded in the dark room, and the film developed in the usual manner. The result is a clear and sharp radiograph of even density over its entire area. All the teeth appear sharply outlined and buttonlike in form, as in Figs. 8, 11, 13.

An unerupted tooth when present, as shown in the several illustrations, is thus conclusively and convincingly localized. If lingual, it appears so on the film and is likewise labial when its shadow is labial. No other deductions or calculations are required. The degree of transverse obliquity is also discernible as well as the axial rotation of the tooth.

It will be noted moreover, as shown in the illustrations, that the negatives made as described are unique in that they are markedly clear with the buttonlike images of the teeth in sharp definition, and those teeth nearest the focal point are shown in cross-section with root canals clearly visible in spite of the mass of anatomy that the x-rays have had to penetrate in passing through the cranium.

It is obvious then that the true occlusal view is invaluable in problems of localization. Its need is sound and basic, and its availability does away with the named difficulties of the other procedures.

Moreover, this simplified technic supplements and widens the scope and perspective of radiodontic diagnosis. The mouth cassette enables one to make comprehensive horizontal views which have many other applications in addition to those related to problems of localizing impacted or unerupted teeth. They present a true picture of arch form and may be used as records of the positions of the teeth before and after orthodontic treatment. Many studies such as Stanton<sup>7</sup> makes from models and also such studies as Waldron<sup>10</sup> shows in his illustrations of normal arch forms may be so made.

These views may also be used as photographic records of appliances as used on the arches. Here they record in detail all of the mechanisms in situ, and are as accurate for record and study purposes as models which require much more time and effort in preparation.

It is obvious that the true occlusal view is invaluable in problems of localization, since it presents an entirely different proposition in its approach and technic as compared with the oblique or pseudo-occlusal radiographs already described. I wish to stress the need of the true occlusal studies in problems of localization and study of arch form because it was in this connection that its need was most intimately felt in my practice and routine problems.

Other uses and applications of the horizontal studies of the teeth will undoubtedly be found as the value of such studies becomes increasingly obvious and when it becomes more generally understood that this is apparently the only means we have of making horizontal radiographs of other structures in the cranium.

This cassette as presented to the profession is the result of much thought, experimentation, and earnest effort to embody in it a simple and practical expedient which facilitates the procedure in horizontal radiographic studies. It is hoped moreover that this newer aspect of radiodontia will be an increasingly useful supplement to our radiographic surveys of the human teeth.

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## A MOUTH TUNNEL FOR INTRAORAL STEREOSCOPY\*

SIDNEY E. RIESNER, D.D.S., NEW YORK, N. Y.

THIS instrument has been designed to standardize the technic for taking stereoscopic intraoral roentgenograms in a more exact relationship than has been the practice until now.



Fig. 1.—The x-ray film with boxing of wax, preparatory to vulcanizing.

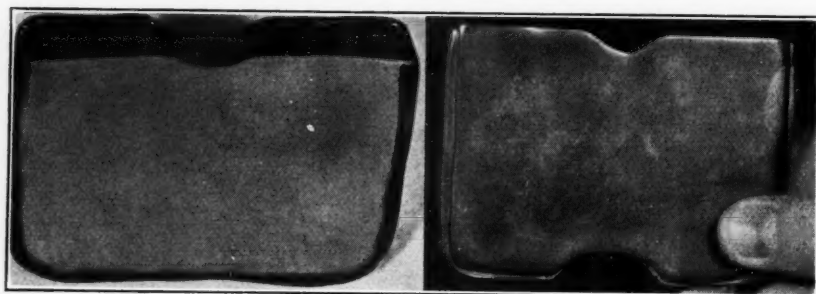


Fig. 2

Fig. 3

Fig. 2.—Vulcanized mouth tunnel with red rubber as supporting base and sides, and white rubber top to permit easier penetration of x-rays.

Fig. 3.—Made in split sections with sliding grooves. This permits easier sterilization.

A Victor-Boland occlusal x-ray film (because of its uniform and even cover) is boxed with wax on all surfaces except one marginal edge (Fig. 1). The film is removed and the boxing vulcanized in one of the celluloid base denture materials, or a combination of red and white rubber. The supporting sides and base are made in the heavier and stronger red vulcanite, and the top in the white rubber to permit the penetration of the x-rays more readily (Fig. 2). The same design may be produced in bakelite, in split sections (Fig. 3).

\*A demonstration presented to the Second International Orthodontic Congress, London, July, 1931.

In making the stereoscopic exposure, the tunnel is placed in the mouth with a film in position and the exposure made for the right side. A new film is inserted

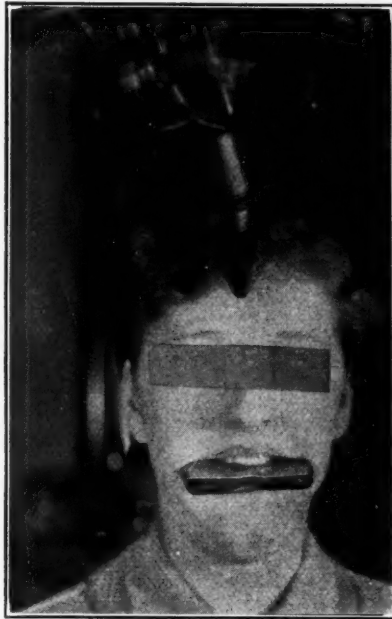


Fig. 4.—Showing the position of the tunnel while the tube is shifted to both the right and the left for stereoscopic exposure. A new film is placed in the tunnel with the teeth in the original position for the second exposure.

while the teeth are locked in their original position on the tunnel. The tube is shifted to the left, and a second exposure made (Fig. 4).

The tunnel is easily sterilized in alcohol, and parallels the automatic change tunnel employed in x-ray technic by the roentgenologists of general anatomy.

## ABSTRACTS OF CURRENT LITERATURE

### NUTRITION AND PEDIATRICS

BY SAMUEL ADAMS COHEN, M.D., NEW YORK CITY

It is the purpose of this JOURNAL to review so far as possible the most important literature as it appears in English and foreign periodicals and to present it in abstract form. Authors are requested to send abstracts or reprints of their papers to the publishers.

**Reestablishing Normal Nasal Respiration After Adenotomy.** Ladislaus Falta. *Monatschr. Ohren.* 66: 5, 1932.

Orthodontists in particular will welcome the simple but ingenious method of overcoming the usual habit of mouth-breathing when it persists following removal of adenoids. As introduced and advanced by Falta the procedure consists simply of having the patients put small quantities of water in their mouths and keeping it there. The author recommends that at first water be retained in the mouth only for two or three minutes and that this duration be gradually increased to ten and even fifteen minutes several times a day. According to Falta more desirable effects are obtained if the solution held in the mouth contained a pleasant odor and is slightly disinfectant. (He suggests some such weak solution containing menthol, alcohol and the like.)

The importance of the restoration of nasal breathing following the removal of adenoids is deservedly emphasized. The author further states that this method provides a simple mechanical incentive toward the restoration of normal nasal breathing. In reporting his results with this procedure from the Surgical Clinic of the Royal Hungarian Franz-Josefs University in Szeged, Falta writes that he noticed that the swelling of the nasal mucous membranes disappeared rather quickly.

This line of endeavor has been tried with children with very gratifying results. Even after such a short duration as a week with this therapeutic procedure Falta found that the patients slept better and also in many instances much of the face deformity, which is an accompaniment of enlarged adenoids, was considerably improved a few months after the treatment was begun. The author points out that this method of restoration of normal nasal breathing can be carried out for other nasal conditions. He further emphasizes the fact that better results are obtained if nasal secretions are removed prior to retaining the water or antiseptic solution in the mouth.

**Enuresis—Its Urologic Aspects.** Meredith F. Campbell. *J. Urol.* 28: 3, 1932.

Campbell feels that normally bladder control should be established by the age of two and a half years, and with rare exceptions children of this age should go all night without wetting the bed. This author who has made many notable



contributions in the study of urology in children considers enuresis "as the unintentional or the involuntary nocturnal or diurnal urination in the absence of demonstrable uropathy." The importance of definite organic basis being the underlying factor in enuresis can be gleaned from the fact that in the author's series of 249 children, four years of age and over (in whom diagnosis of enuresis was made by clinicians and in whom medical physio- or psychotherapy had failed), over half, or 60 per cent, had some definite organic basis for their urinary symptoms.

The theories of the etiology of enuresis are legion and include many far-fetched and fanciful notions, particularly from psychiatrists. Campbell considers the family background to be of some importance, and he states that in two families, bedwetting was traced through three generations, and in one instance, bedwetting continued through adulthood.

Because physical examination of children with enuresis usually reveals many physical defects and neuropathic disturbances, Campbell feels that the incidence of these is only slightly if any greater in children with enuresis than in the non-enuretic children living in similar social and economic surroundings. Naturally, when there are so many factors which may contribute to etiology, it is to be expected that there be many methods of treatment. Accordingly, over thirty drugs have been advised as sure cures for bedwetting. Campbell rightly states that all forms and kinds of therapeutics including, of course, correction or elimination of physical defects have been used with or without success in children with enuresis.

Regarding the approach to treating a child via psychiatry, the author is to be particularly commended for his statement that "certainly the toilet should not be the battleground for child training . . . ." He wisely states, however, that encouragement and cooperation will usually be effective when the enuresis is entirely functional, but the bedwetting problem should not be permitted to constitute the child's entire horizon.

This authority states that although in some instances the symptoms of enuresis may disappear in later childhood, the underlying pathology still remains, and for this reason he urges that when children over four years of age with enuresis have gone through an intensive medical physio- or psychotherapy unsuccessfully for two or three months they should be given a urologic examination.

The author's routine in these cases consists of (1) physical examination, (2) neurologic study of the lower cord and sacral innervation, (3) urinalysis of catheterized specimens in females and voided specimens in males, (4) a measuring of residual urine (considered most important by the author), (5) cystometry including determination of the myogenic and neurogenic balance of the bladder, (6) roentgenography, (7) cystograms with 5 per cent solution of sodium iodide, (8) cystoscopy (and the author mentions that in 85 per cent of the cases in his series such a procedure was performed without the aid of a general anesthetic).

Even though such complete urologic examination is negative, Campbell is of the opinion that further medical therapy or psychotherapy may be carried on "with the assurance that no marked destructive uropathy is in progress and that the child will eventually cease wetting."

**The Relation of the Intestinal Tract and Diet to the Treatment of Arthritis.**

Ralph Pemberton and E. G. Peirce. *Ann. Int. Med.* 5: 1221, 1932.

The authors state that although infection plays an important rôle in individuals with arthritis, nevertheless, they are of the opinion that in many instances the background, upon which infectious processes become operative, is laid long before these processes actually develop. They further state that it is becoming increasingly clear that factors quite other than infection may operate to induce and perpetuate the disease.

Pemberton, who is an authority on arthritis, and his coworker, Peirce, point out that they, as well as other observers, have been impressed by the frequency with which anatomic, topographic and physiologic abnormalities of the intestinal tract can be demonstrated in arthritic patients by x-ray studies. As a matter of fact, under appropriate conditions of diet these abnormal configurations of the intestines, particularly of the large intestine return to normal. Similar notations were made in those cases of arthritis in which the removal of focal infection and also physiotherapy played conspicuous rôles in the treatment. As a result of these clinical observations the authors feel justified in stating that the abnormal contour and its presumably abnormal function of the intestine become an additional or causative factor to perpetuate the disease.

The diet recommended in the treatment of arthritis consists in the main of a low caloric intake. Incidentally it may be mentioned that Pemberton and Peirce do not credit vitamins with any specific virtue in the treatment of arthritis. Furthermore, the authors' experiences are in accord with others when they state that it was observed in the army that "under conditions approaching starvation a surprising degree of restoration of function sometimes took place in joints which had apparently been largely or wholly ankylosed." However, in this respect the authors wisely emphasize that "*underfeeding for any purpose is a two-edged tool which must be circumspectly used.*" (Italics authors'.) They further point out that the extent to which the influence of restricted caloric intake—that is a reduced dietary intake—is strictly conditioned by the nature of the cause of arthritis, the extent to which these causes can be removed, the nutrition of the patient, the existence of complications, the degree and chronicity of invalidism, the extent of the activities of the subject, and many others.

In other words the etiology of arthritis in large involves a cycle in which various factors are coördinated, and no one can be justifiably stressed, etiologically or therapeutically, to the exclusion of the rest.

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## EDITORIALS

### Orthodontic Diagnosis for the General Practitioner

THIS title might seem to imply that the demands of orthodontic diagnosis are possibly different for the general practitioner than they are for the man or women whose energies are directed exclusively to the practice of orthodontia. In considering this matter, let us first review briefly the problem involved and then decide what differing responsibilities, if any, apply.

Those who practice orthodontia are confronted with the treatment of oral deformities due to a great variety of causes. While popular conception accords to

orthodontia the purpose of correcting so-called malocclusion, experience has taught us the inadequacy of this term, unless it be made inclusive of a far greater range of pathologic conditions than is represented by malaligned and malfunctioning teeth; for we may have any of the following fundamental pathologic conditions conjoining in cases presenting themselves for treatment: (1) malposition of individual teeth; (2) maldevelopments of arch form; (3) malrelation of the dental arches; (4) malrelation of the dental arches and maldevelopment of the maxilla or mandible, or both; (5) miscellaneous deformities, including such congenital conditions as maxillary cleft, deformities due to prenatal influences, to fractures, burns, blows, etc.; those resulting from disease, e. g., fibroma, ankylosis, etc. We also meet with abnormalities of dentition, such as anomalies of form, of number, and of eruption.

It is possible for a case to embody any one, or several, of these abnormalities. While simple malocclusions are by no means rare, we are faced with the fact that in a large percentage of the cases we are called upon to treat, we are dealing with dentofacial deformities which, in character, are complex morphologic deviations, including not only the teeth and alveolar processes, but extending beyond these boundaries and involving the jaws and, in many instances, some of the external features of the face.

The one who attempts, therefore, adequately to meet the problem of orthodontic diagnosis must determine the true character of such anomalies, their extent, and the various conjoining parts involved. That our old methods of intraoral examination and appraisal have proved inadequate in all too many instances, is forcefully brought to our attention by failures in treatment. While such instances cannot all be accounted for on this ground, it has doubtless been responsible for an appreciable quota.

In considering the term "orthodontic diagnosis," we must realize that there is a vast difference between making an actual diagnosis and realizing the necessity for such a procedure. In other words, one may detect a developing anomaly and realize the necessity for orthodontic intervention without actually making a definite diagnosis. This is where the general practitioner and the orthodontist may cooperate to the decided advantage of those coming under their care. The general practitioner is the first to come in contact with the child patient and, therefore, should be keenly alert to any early symptoms which would indicate a developing anomaly. Every malaligned tooth or slight variation of the denture does not necessarily mean the onset of a condition which must receive orthodontic treatment. As a matter of fact, certain conditions in the denture which sometimes give alarm are but phases of development. The important thing is to know the true danger signs, and those which are benign in character.

The interest of the general practitioner means much to the child patient. Many young patients have border line cases which should be kept under observation, and such surveillance continued until their status can be definitely determined; i. e., whether they need orthodontic treatment or can be dismissed as falling within the range of the normal. Frequently, some simple intervention at the proper period, in such cases, will prevent the development of serious anomalies. This may be the extraction of a deciduous tooth at an opportune time, a



slight movement of an incisor which is becoming mallocked with the opposing teeth, the simple grinding of an opposing tooth surface, the insertion of a space retainer, or some other means of keeping the developing denture in function. Such measures sound simple and unimportant, but when indicated may mean the difference between normality and deformity at a later period in the child's life.

If diagnosis is to point the way to intelligent treatment, it must reveal the character and degree of abnormality present. The purpose of such a quest is not to determine mere gross generalities, but to reveal the part or parts of the oral ensemble which are abnormal, what character of deviations are manifest, and the approximate degree and extent of each involvement. To make such a survey with accuracy, each case should be recorded with suitable denture and facial reproductions, which should be supplemented with roentgenograms of the dental and oral field. Denture reproductions, or dental plaster casts as they are more frequently called, should be made in such a manner that the orientation of the denture to its dependent facial structures is revealed. Facial reproductions, whether they be obtained through the use of the photostatic clinical camera or otherwise, should be made in a definite ratio of life size, show the interrelations of the jaws, as well as their cranial relationships, and should reveal, in so far as possible, the correlation between the denture and the face.

With such records before him, the practitioner may note (1) the occlusion of the teeth, the form and relationship of the opposing dental arches; (2) whether or not the anomaly extends beyond the immediate area of the teeth and includes the alveolar portion of the jaws; (3) or beyond these boundaries, and involve the maxilla or the mandible, or both; (4) in the case of the mandible, whether the body or the ramii are involved, and if so, to what extent each contributes. These records should be supplemented by thorough intraoral and extraoral study of the musculature of the face and of the tongue so that any abnormalities of these structures may be noted. In other words, every part of the oral ensemble affected by, or contributing to, the anomaly should be differentiated. In establishing a basis for comparison between conditions as recorded and those which may reasonably be considered "the normal," "the mean," "or average," usually encountered under normal conditions may be used as a criterion. Following this, a finer differentiation should be made when determining the needs of treatment by considering each case upon the basis of its individual typical requirements. Only when this point has been reached is the practitioner in a position to direct his efforts intelligently and skilfully in the field of treatment.

From the foregoing, it should be obvious that there is no double standard in the field of orthodontic diagnosis, and those who attempt such procedures should be fully prepared.

*J. D. Mc.*

### The Southern Society of Orthodontists

THE meeting of the Southern Society of Orthodontists in Knoxville, Tennessee, on October 31, November 1 and 2, has been reported by those in attendance to have been most outstanding and extraordinary in many ways. Reference is made, particularly, to the trend of the papers which were highly scientific and directed toward the modern thought of osseous growth and development. The "Summary of Trend of Papers" by Dr. W. W. Woodbury, of Halifax, Nova Scotia, which follows, is self-explanatory.

To give our readers some advance notice of what is in store for them in these papers, the Summary follows:

*Editor.*

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#### Summary of Trend of Papers Presented Before the Southern Society of Orthodontists

W. W. WOODBURY, B.Sc., D.D.S., HALIFAX, N. S.

That it was the desire of the President to create an atmosphere congenial to the scientific point of view at the very outset of this meeting was evident when Dr. Wood reminded us, in his presidential address, that fixed opinions retard progress, and when he asked us why, with so much to be discovered, orthodontics was sometimes so prone to take its present status so seriously.

The Society and Dr. Wood are to be congratulated on the President's Address.

#### A REVIEW OF BRASH ON "CONDITIONS OF GROWTH: PHYSIOLOGIC AND PATHOLOGIC"

BY HUGH K. HATFIELD, BOSTON, MASS.

Dr. Hatfield struck the keynote of this gathering when he pointed out that "modern science can make an impressive impact upon popular orthodontic concepts" as evidenced by Professor Brash's book. He stressed the necessity for accepting evidence, and evidence only, in coming to conclusions. He pointed out that no one today who pretends to do serious thinking hesitates to ask "How have you reached your conclusions?" In science the voice of authority as such is dead. In orthodontics it may have lost some of its resonance but it still carries too far.

During recent years we have been asking ourselves how the environment can affect the organism so as to bring about the anomalies with which we are concerned. We are now beginning to realize that whatever influence the environment may exert it has "very varied material to work upon" in different individuals. It is also being impressed upon us that we cannot treat inheritance and environment as separate entities; the one is meaningless without the other; but we are advised to look, for the immediate future at least, in the direction of inheritance.

In a discussion of nutrition we are warned that "the evidence is lacking that general defects of nutrition have any selective action on the jaws," the work of Friel and the views of Professor Mendel being cited in substantiation; but growth as a whole will "mark time" if there is a relative shortage in some essential nutritional element. This does not necessarily mean, however, that there will be change in form.

Much has been written to prove that vitamin deficiency and rickets as a deficiency disease are true causes of malocclusion. This is branded as largely speculative. Calcium-phosphorous balance is now very much to the fore, but the total picture is not clear-cut as yet. No correlation has been established between artificial feeding, as such, and malocclusion. The normal human fetus is a parasite, and if the diet is short in inorganic content, the mother will suffer more than the child. There may be "feebleness of growth" to use Jansen's term, but it is yet to be shown that malocclusion necessarily results. There has been much speculation with regard to fetal pressure, but it remains speculation.

Dr. Hatfield cited the pioneer work of Dr. Howard in the endocrine field as being a real contribution to the wider study of our problems.

He did not find the negative conclusions of Brash disappointing or discouraging if they enable us to see things as they are.

Did not Plato say that science was seeing things as they really are?

DISCUSSION OF DR. HATFIELD'S PAPER BY GEORGE R. MOORE, ANN ARBOR, MICH.

In his discussion of Dr. Hatfield's paper Dr. Moore saw in Brash's work the climax of the efforts of those who have dared to say "We do not know," and it took some daring in an orthodontic gathering not so many years ago.

In closing the discussion Dr. Hatfield emphasized the fact that Brash does not forget environment—he simply asks that *we* do not forget inheritance, which he feels we have done as a group.

PRELIMINARY STUDY OF SKULLS AND TEETH OF DOGS BY A. LEROY JOHNSON,  
NEW YORK CITY

Dr. Johnson reminded us, in introducing his subject, that for most of us our orthodontic bringing-up instilled the conception of a perfectly developing dental mechanism unless interfered with by extraneous forces. In other words, environment was the bad boy who threw the monkey wrench into an otherwise smoothly running machine. This point of view in effect held the growing mouth clear of the biologic field; this anomalous condition of affairs was due to the fact that orthodontics had been developed by technicians who afterward tried to explain the original positions of the teeth they had learned to move. Heredity was conceived of as an entity, something that does things. Environment comprised other forces that did things to the growing organism. It has taken us some time to realize that development is an interaction between the genes, or whatever may be the ultimate units of heredity, and environment in its broadest sense.

Dr. Johnson then reported on material from the Cornell Morphological Farm and showed some of the results obtained by crossing pure bred dogs; a study of structural types. Prof. Stockard, the director of this experiment in genetics, selected the dog because:

- (1) The parental characters are clearly defined.
  - (2) The ranges of variability do not overlap.
  - (3) Environmental influences do not obliterate the differences between types,
- and
- (4) The coefficient of variability for each parent type is small.

It was pointed out that certain humans parallel these dog types in a significant way and that there is reason to believe that the endocrine layout behind similar morphologic pictures in the human and the dog is also similar. Also Stockard has produced evidence that there may be mild degrees of achondroplasia, for example, hitting certain parts of the skeleton, as a result of genetic constitution. This is counter to the teaching of Brash, who holds that there is no evidence of a selective influence on the jaws as the result of endocrine imbalance without general manifestations being present at the same time. It is fair to add that Stockard's work was not available to Brash when he wrote his book. This naturally leads one to inquire into a possible genetic foundation responsible for the particular endocrine picture which is in turn responsible for the morphologic result.

This work has brought out the fact that so complex a thing as leg form, for example, behaves as a simple Mendelian factor. The skull, however, is much more complex from the Mendelian standpoint.

The environmental background of these animals is as nearly standardized as human ingenuity can make it, and yet the crosses show in some cases paralysis of the limbs and in others variations in tooth structure that look very much like the results obtained by certain nutrition experiments. In the light of this, Mellanby's statement that "perfect structure can be insured" by adhering to a certain dietary sounds a bit too dogmatic. Mellanby worked on unknown genetic material.

Other high lights that appeared were: Cranial width is almost constant through the different types ranging from the Pekinese to the Great Dane, only showing a variation of some 20 mm.

Jennings tells us that genetically the normal predominates over the abnormal. Stockard shows that abnormalities are sometimes dominant in a genetic sense.

In the  $F_2$  litter of some crosses we get some individuals with loose teeth due to faulty supporting alveolar bone, together with others with normal development, the parental background being the same.

In a large skull resulting from the internal pressure of hydrocephalus the wall is paper thin. There has not been growth of bone under the influence of the expanding brain. This does not strengthen the orthodox orthodontic teaching that mechanical pressure causes bone to grow.

DISCUSSION OF DR. JOHNSON'S PAPER BY SAM G. COLE, ATLANTA, GA.

Dr. Cole's closing comment in discussing Dr. Johnson's paper was as follows:

"It is possible and probable that biologic experimentation may at some time prove that many conditions of malocclusion are inherently incapable of responding to orthodontic interference. That would be a godsend," to which one is inclined to add—Amen.

ROENTGENOGRAPHIC MEASUREMENT OF THE DEVELOPMENTAL AND ORTHODONTIC  
CHANGES IN THE FACES OF GROWING CHILDREN BY B. HOLLY BROADBENT,  
CLEVELAND, OHIO

Dr. Broadbent explained for us the work that is being carried on in Cleveland under the direction of Dr. Wingate Todd. He showed the devices that had been elaborated to insure a standardized radiographic technic that makes possible com-



parisons at different ages and comparisons of different living heads with an accuracy that approximates cephalometric laboratory work. We could not but be impressed by the ingenuity and thoroughness of the methods evolved.

Dr. Broadbent's discussion of possible lines of reference to be used for making comparisons, for example the Frankfort horizontal, the porion (or ear-hole)-nasion and the sella turcica and base of the brain, brought out the fact that the sella turcica-nasion line remains practically unchanged for a considerable time about the ages six to eight years. Also that during development the ear hole drifts down and back relative to the sella turcica. We were shown how the path of tooth eruption relative to these lines of reference could be demonstrated as also the calcification of the teeth. The essayist asked us to consider the advantage of this method over anatomy room study on the ground that "a dead child is likely to be a defective child."

In summarizing Dr. Broadbent noted, in addition to the above, that this method has the advantage of getting at certain hard tissue landmarks direct, not through a soft tissue covering of uncertain thickness.

He urged that we had a method of establishing standards based on healthy growing children.

We could also study the effect of missing teeth and of the results of extraction.

DISCUSSION OF DR. BROADBENT'S PAPER BY HARRY E. KELSEY, BALTIMORE, MD.

Dr. Kelsey expressed the feeling of the Society when he thanked Dr. Broadbent for the presentation and noted the tremendous amount of persistent patient ingenuity displayed in the elaboration of this technic.

Dr. Howard warned us that "certainty is not a part of biologic science," possibly feeling that there is danger that such procedures may be misused by those who are ever on the look-out for diagnostic short cuts.

GROWTH OF THE FACE AND OCCLUSION OF THE TEETH IN RELATION TO ORTHODONTIC TREATMENT BY MILO HELLMAN, NEW YORK CITY

Dr. Hellman's contribution is an addition to the picture he has been gradually building up of the unfolding of the human face and the development of the dentition.

He warns us that malocclusion of the teeth is due to arrested development; but that such arrest of development can be controlled mechanically by orthodontic appliances so as to influence facial growth in any fundamental way *cannot be upheld*.

He reminded us that development comprises growth (i. e., increase in size) and differentiation (i. e., change in proportion and position). Along with growth, the differentiation that occurs manifests itself in part in a forward and lateral thrusting of the face which is relatively greater at the lower or mandibular levels accompanied by a growth increase in the posterior mandibular region. This latter growth is accentuated during periods of molar eruption.

The oclusal status is a manifestation, or as Dr. Hellman calls it a "symptom," of the development of the face. He does not hesitate to state that we do not know the cause of malocclusion. He insists that inherent facial growth tendencies are not altered by oclusal changes and that if orthodontic treatment is to be successful it must, in so far as our knowledge permits, be harmonized with the growth

process, and he also feels sure that an examination that does not take into consideration the process of development but is based on "the occlusion of the teeth at one particular instant" is in many cases of not very great consequence.

He pleads for a periodic check on the growth of our patients and says, "I have even found that the changes in occlusion are at times so marked as to obviate the need of orthodontic treatment."

DISCUSSION OF DR. HELLMAN'S PAPER BY C. C. HOWARD, ATLANTA, GA.

In discussing this paper Dr. Howard noted Dr. Hellman's reference to changes that had taken place in some cases in spite of the mechanical locking of tooth cusps in normal relation. The orthodox orthodontic teaching of not so long ago would have it that once typical occlusal relations are attained all is well.

He also warned us that the result of statistical study is to point to the expectancy of certain relations but that expectancy should never be confused with certainty; in other words, statistics will never tell you precisely what the individual will do. They will point to the general trend of the group.

The papers of Johnson, Broadbent and Hellman taken together are an impressive demonstration of the vast amount of work necessary to accomplish anything of moment in the field of serious research.

My own paper on the final lecture of Professor Brash's book which deals chiefly with the interplay of form and function as related to orthodontics you have listened to so recently that I shall not attempt a summary. I wish to thank Dr. Hale for his discussion. One might note especially his warning that "after all, knowledge is only relative." This is a comparatively recent note in orthodontic thought, and Brash's work will do much to strengthen it. The orthodontist until quite lately has been seeking for absolutes. If we feel that Brash's negative attitude toward many of our firmly intrenched ideas is a bit upsetting, regarding the etiologic potency of thumb-sucking for instance, and the supposed bone molding power of muscle action, we must remember that Brash has no axe to grind; he simply asks for evidence; and we may recall Northcroft's words, which Brash quotes, "I confess there are models in my collection that serve to prove and disprove any dogma."

I have already quoted Osler. I am going to suggest that we allow this prince of clinicians to bring to us as clinicians our parting message.

In his farewell address to American and Canadian medical students on the eve of his departure from Johns Hopkins to take up his work as Regius Professor of Medicine at Oxford, Osler spoke of the *student-practitioner*, the *student-specialist* and the *student-teacher*. It seems to me that his description of the student-specialist applies particularly to our calling, and I think Osler would approve of the attitude of those responsible for this meeting in stressing the necessity for a sincere attempt to attack our problems at their foundation. May I quote a part of what he said at that time.

"The student-specialist has to walk warily, as with two advantages there are two great dangers against which he has constantly to be on guard. In the bewildering complexity of modern medicine it is a relief to limit the work of a life to a comparatively narrow field which can be thoroughly tilled. To many men there is a feeling of great satisfaction in the mastery of a small department, particularly

one in which technical skill is required. . . . The dangers do not come to the strong man in a specialty, but to the weak brother who seeks in it an easier field in which specious garrulity and mechanical dexterity may take the place of solid knowledge. All goes well when the man is larger than his specialty and controls it, but when the specialty runs away with the man there is disaster, and a topsy-turvy condition which, in every branch, has done incalculable injury. Next to the danger from small men is the serious risk of the loss of perspective in prolonged and concentrated effort in a narrow field. Against this there is but one safeguard—the cultivation of the sciences upon which the specialty is based. The student-specialist may have a wide vision—no student wider—if he gets away from the mechanical side of the art, and keeps in touch with the physiology and pathology upon which his art depends. More than any other of us, he needs the lessons of the laboratory, and wide contact with men in other departments may serve to correct the inevitable tendency to a narrow and perverted vision, in which the life of the ant-hill is mistaken for the world at large.”

I suspect that “the cultivation of the sciences on which the specialty is based” is not likely to strengthen very much the perennial hope so thinly veiled in much contemporary orthodontic writing of sometime lighting upon a prime solvent for all our difficulties, a special formula or procedure either diagnostic or therapeutic or both, which may be applied to the case and yield the desired answer automatically, much as an adding machine does when the proper keys are struck. Perhaps this dream is the peculiar will-o'-the-wisp of those specialties which demand large employment of “technical skill” and “mechanical dexterity” to which Osler alludes.

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#### **Views of the Twelfth Annual Meeting of the Southern Society of Orthodontists**

At the recent meeting of the Southern Society of Orthodontists at Knoxville, Tenn., October 31, November 1 and 2, it was quite apparent that everyone in attendance enjoyed the very worthwhile program.

The essayists, who were selected to present views on converging lines, successfully and forcefully impressed the fact that many assumed orthodontic beliefs are based on as yet unproved theories. The recent indictment by Brash, a résumé of which was ably presented by Drs. Hatfield and Woodbury and their discussors, has to some extent at least been successfully combatted. However, Brash and Simon have stimulated thought, investigation and research to verify or disprove their statements, which have already promoted, and will continue to promote, the greatest advancement our profession has made in the past decade. Mechanics has predominated in this profession, and probably as yet necessarily does predominate; since attention is often given more to treatment of effects rather than to an attempt first to find the basic causes. It therefore follows that improved mechanics has to some extent hindered a better understanding of and proper study toward a full realization of the many far-reaching fundamental causes, and has given many local contributing causes, even though of great importance, an unwarranted value in making a diagnosis and in outlining treatment.

Dr. Johnson's “Preliminary Report on the Skulls and Teeth of Dogs” and

Dr. Broadbent's as yet unfinished report on "Roentgenographic Measurements of the Developmental Changes in the Faces of Growing Children" are worthwhile examples of real work. The results of such efforts will present evidence that will be of material aid to us.

Dr. Hellman's paper on "Growth of the Face and Occlusion of the Teeth in Relation to Orthodontic Treatment" presented ample evidence of the probabilities and possibilities of certain phases of orthodontic treatment. Results may be acceptably good or disappointingly bad, and neither is the direct result of an excess or lack of skillful application of a mechanical force. Dr. Howard's discussion pointed out the interplay of the ever present assisting or conflicting impulses of endocrine control or embalance, which may aid or hinder us. With some 50 per cent or more of our cases so hindered, we must go beyond generalities in statements and beliefs on this subject as it applies to our specialty, unless we are to continue to wander in a labyrinth of guesswork.

Some twenty-five or more clinics were presented at a night session, a new time-saving procedure, as it permitted more time than is usually allotted to clinics, and was apparently acceptable to the membership as evidenced by the attendance and attention given to each clinic. Such programs as presented by the Southern Society of Orthodontists incite the studious practitioner to an ever enlarging scope of study and practice. Individual benefit will result, not in accepting in toto every theory presented, but rather through study to prove or to disprove conflicting theories. Tabulation of evidence appeals to but very few members of the profession. Accepting any theory as a statement of fact requires less mental and physical effort than is required to refute it; but with so many variations of the individual normal, with so little known as to the inherent possibilities of each individual, with the very apparent difficulties in securing and maintaining a control of even an assumed individual normal upon which any research can be even helpfully based, it therefore becomes apparent that a vast laboratory for observation and securing worthwhile data is being neglected in our private practices simply because of a universal failure to utilize it. Climatic variations, seasonal variations as to duration and intensity, and differences in chemical content of like foodstuffs from different localities offer an ever changing experimental field for study and correlation of data, which would be helpful as our program becomes more intricate and the field of study enlarges.

With a Democratic victory in the near offing, Southern hospitality was flowing freely. President and Mrs. Claude Wood were ideal host and hostess and arranged everything for the comfort and pleasure of everybody, and they were ably assisted by the members of the local dental society and their wives. A bridge luncheon and a theater party were arranged for the ladies on Monday.

On Tuesday everyone was invited to take a motor trip through the Smoky Mountain National Park. Aided by an ample supply of refined Tennessee Mountain Dew, the mists and fog disappeared; the trees were clothed in various shades of golden raiment; unending beautiful vistas appeared as if by magic; and the mountain road became an imaginary straight line that led on the return trip to a banquet fit for a king. After being refortified with an Ocracoke special a la Dr. Mann, which enlarged the already oversized appetites, proper action was



bestowed upon the Texas grapefruit, Maryland oysters, Virginia ham, Georgia fried chicken, Mississippi yams, Idaho baked spuds, Alabama turnip greens, Kansas whole wheat hot rolls, Oregon apple pie, and Car-O-lina tobacco.

Karl Mott, impersonating Big Chief Te-Go-Ha-Ha (meaning Old High Pockets), delivered a stirring after-dinner oration and in atonement for past tribal wrongs returned a crop of greatly needed golden locks to Republican Bill Flesher's shiny pate. Big Chief Te-Go-Ha-Ha, with the assistance of Oren Oliver, Min-Ne-Ha-Ha, his wife, and his sons Cli-Quo-Ha-Ha Waugh, Bog-Gy-Ha-Ha Kelsey, Chew-Chaw-Ha-Ha Muscle Robison, Clint Howard Hy-Po-Ha-Ha, a papoose, gave a series of Indian songs and dances, followed by an exhibition of fancy archery, bull, and blowgun shooting. Walter Morgan, a toothbrush salesman from Penelope, mingled in the crowd making many sales.

Having tasted of the waters of Caney Fork, we anticipate many more pleasure trips to Tennessee.

In the closing session Wednesday, Dr. N. F. Muir of Roanoke was installed as president; Dr. W. P. Cain of Chattanooga as president-elect; Dr. Wm. P. Wood of Tampa as secretary-treasurer; and the Society selected Hot Springs, Virginia, as the meeting place for 1933.

*P. G. S.*

## IN MEMORIAM

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WILLIAM CUMMINS FISHER

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1876 - 1932

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THE death of Doctor William Cummins Fisher marked the passing of one of the leading benefactors of organized orthodontia, and a host of dentists throughout the world lost a devoted and loyal friend.

Doctor Fisher was born in Washington, D. C., July 14, 1876, and died in Bronxville, N. Y., October 14, 1932. He was the son of Henry Fisher of Washington and Mary Snyder Fisher formerly of Baltimore, Md. He was married in 1907 to Miss Adelaide Jacques, who survives him. After obtaining his early education in the schools of Washington, D. C., he entered George Washington University, Dental Department from which he received the degree of Doctor of Dental Surgery in 1899. He continued his professional education at Magill University, Toronto, Canada, and the University of Dublin, Ireland.

Following the completion of these courses he located at London, England, where he practiced dentistry for two years in association with Doctor Louis J. Mitchell. It was during this period that Doctor Fisher became familiar with general dental conditions and customs in Great Britain and the principal countries of Europe. This gave him a valuable fund of knowledge which he was destined to use so effectively in later years.

In 1901 the United States Congress passed a bill authorizing thirty contract dental surgeons to provide dental service for the regular Army. Doctor Fisher returned to the United States and successfully passed the competitive examinations and received an appointment in the original group of thirty men. He served in this capacity from August, 1901, to July, 1904, and was stationed for the principal portion of this service at Fort Sheridan, Illinois, and adjoining Army posts. Upon resigning from the Army dental service he came to New York and became associated with Doctor A. W. Harlan in general dentistry, and upon Doctor Harlan's death he became his successor in practice.

Doctor Fisher became a member of the National Dental Association, Section of Stomatology of the American Medical Association, the New York State Dental Society, the Dental Society of the City of New York and the Institute of Dental Technique. It was through the medium of these organizations that Doctor Fisher extended his energies toward the advancement of the welfare of our profession. He was a former president of the Institute of Dental Technique and chairman of the Section of Stomatology of the American Medical Association in 1914.

He was appointed a Major, Dental Corps, U. S. A., with rank from November 8, 1918, and was assigned to duty as chief of the Dental Clinic in Debarkation Hospital Number 5, at New York City, and was honorably discharged April 29, 1919.

He was appointed lieutenant colonel in the Dental Reserve Corps in 1919, and upon the expiration of that commission in 1923 he was advanced to the grade of colonel which commission in the Dental Reserve Corps he held at the time of his death. Doctor Fisher was active for several years in the Association of Military Dental Surgeons and was at one time editor of the journal of that organization. He was also a past president and was later made an honorary member.

Doctor Fisher was always interested in the science of orthodontia as his favorite branch of dentistry and from the beginning of his professional career followed its progress with zeal and enthusiasm believing in the possibilities which it offered for a greater service to humanity. He was a faithful attendant at the annual meetings of the American Society of Orthodontists and attained an unbroken attendance record of more than twenty consecutive years. He became a member of that organization in 1917 and from that time devoted his principal activities to the work he loved so well. In 1921 he conceived of the need of a sectional orthodontic organization which would represent the profession over the territory from Boston, Mass., to Washington, D. C., inclusive. After conference with various friends he called together a group of eight specialists to discuss the matter, and the result was the organization of the New York Society of Orthodontists of which Doctor Fisher and his consultants became known as the founders. He chose to accept the office of secretary-treasurer, which he held for many years, because he believed that he could give more time and care to the growing organization in this capacity than any other way. His efforts and energies were tireless, and it was through his coordination in the earlier years that the New York Society has grown to be the largest sectional organization in the United States and a strong contributor in the advancement of science and literature generally. He served on many committees and assisted the officers as an advisor and later became president of the Society in 1930. Doctor Fisher was made president elect of the American Society of Orthodontists in 1925. At the time of his election he submitted a plan for the First International Orthodontic Congress. This came at a very psychological time in the history of orthodontic organizations; at that time there were seven in the United States and several in foreign countries. At the Congress they were to be combined under the sponsorship of the American Society of Orthodontists. Doctor Fisher was made president general, and this perhaps gave him the greatest opportunity to show his genius as an organizer. He called to his aid men who he thought were best adapted to render assistance in the various departments of such a large organization, and he supervised and worked with them. The Constitution and By-Laws for the Congress were written, and the entire plans of the organization were formed including the smallest details. Every orthodontic society in the world subscribed and pledged dues for each of its members to become members of the Congress. This entitled them to full privileges and to a copy of the proceedings. A large number of dentists made independent subscriptions which entitled them to attend the Congress and receive a copy of the proceedings. It was through the most careful management on the part of Doctor Fisher that the successful financial arrangements were completed. This enabled the organization of the Congress to spend such sums of money which in every particular would contribute to the success and magnitude of the meeting. The procurement of essays, case reports, clinics, exhibits and all scientific materials were collected with Doctor Fisher

working in direct contact with his committees. His earlier experiences in Europe were a great asset in establishing contacts with foreign societies, and the procurement of selected scientific material from the different countries was accomplished largely through his suggestions. It was almost entirely through his direction that the foreign responsibilities were cared for, and every expense to meet their requirements was met. The vast amount of work which was necessary to perfect such a large organization was only exceeded by the harmony with which it was completed. A large number of men held either offices or assignments of grave responsibility, and during the entire year the spirit of cooperation eliminated the slightest sign of discord and overcame all of the most difficult obstacles. The Congress was held in New York City in August, 1926, and the schedules were so carefully arranged that everything transpired exactly as planned, and the program in all of its entirety came to pass in a manner exceeding Doctor Fisher's hopes and those of the men who had labored so earnestly and cheerfully with him. It was largely due to Doctor Fisher's capacity as a presiding officer that the meeting progressed so smoothly. Men came from all over the world, and it was the largest and most successful meeting in the history of orthodontia. The exchange of knowledge effected such an impetus universally that a Second Orthodontic Congress was proposed to be held in London, 1930, in the view of perpetuating the organization with meetings every five years. In order to meet at the time of the Eighth International Dental Congress which was to be held in Paris in 1931, the date of the Second Orthodontic Congress was changed to August, 1931, to meet the convenience of those who would travel to attend both meetings. While Doctor Fisher was in London in July, 1931, shortly before the Congress, he contracted pneumonia which prevented him from attending the meeting. This was a bitter disappointment to him at the time, and complications following this illness eventuated in his death.

He was an honorary member of the European Orthodontological Society, the Southwestern Society of Orthodontists and the Southern Society of Orthodontists.

In addition to his activities in orthodontia Doctor Fisher was interested in other organizations. Principal among them was the Ninth District Dental Society of New York which he loved very much and of which he was a past president. He was very close to all of the members, and it seemed like a big family to him in which he shared their love and defended their interests with equal rights. Doctor Fisher represented the Ninth District Dental Society as a delegate both in the American Dental Association and in the New York State Dental Society for several years. He was president of the New York State Dental Society in 1930 and conducted a very large and successful meeting. His familiarity with the New York State Dental Society made him an able counselor and representative in both the State and the American Society.

Doctor Fisher's first thought was for the advancement of orthodontia as a definite branch of dentistry, so that it would reach the highest standards in a great service to humanity. He believed in this progress through the medium of organization and that for organizations to be successful they had to be managed carefully. His own convictions were unselfish and were centered in the mutual interest of all concerned. In politics he was a clear thinker, a hard fighter and never shrank from anything which he felt was a matter of principle, responsibility or



duty. He was constantly in quest of progress, and after any discussion he could turn to those whose opinions may have differed from his and offer them all the kindness of his personal friendship.

Among his chief characteristics were his interest in younger men, respect for his seniors, and the care of his associates whose health would not permit them to practice. He always enjoyed seeing high class young men enter upon their professional careers and would go far out of his way to assist or encourage them. He never lost sight of the fact that it was a duty of the older men properly to stimulate and prepare by training those who are to assume the responsibilities and carry elevating standards into the future.

His last days were spent in the memories of the many contacts and friendships he had made in his most active years. He lived in the love of the organizations to which he had devoted himself so loyally and in thinking of every one with whom he had come in contact as his friend. His great wish was that the work should go on, and one of his last expressed thoughts was to give "his love to all the boys."

His spirit will remain in the memory of his friends as long as the last shall live, and when future histories of orthodontia are written, his lasting contributions will be inscribed.

## **NEWS AND NOTES**

### **The Great Lakes Association of Orthodontists**

The annual meeting of the Great Lakes Association of Orthodontists will be held in Cleveland, Ohio, February 27 and 28, 1933.

A cordial invitation is extended to all ethical practitioners of dentistry and orthodontia to attend this meeting.

RALPH P. HOWARTH, Secretary-Treasurer,  
1140 Hanna Building,  
Cleveland, Ohio.

### **The Southwestern Society of Orthodontists**

The Governing Board of the Southwestern Society of Orthodontists has decided to postpone the 1933 meeting at Abilene, Texas, until 1934, in order that the Society can put forth all its efforts toward making the American Society of Orthodontists' meeting at Oklahoma City a great success.

GUY M. GILLESPIE, President,  
Abilene, Texas.  
CURTIS WILLIAMS, Secretary,  
716 Medical Arts Building,  
Shreveport, La.

### **Dental Society of the State of New York—Preliminary Program**

The Dental Society of the State of New York will hold its sixty-fifth annual meeting in Syracuse, New York, May 11, 12 and 13, 1933. Literary exercises, exhibits, etc., will be held at the Hotel Syracuse. Harvey J. Burkhart, 800 E. Main St., Rochester, N. Y., is chairman of the Program Committee; Emory Thompson, 333 Linwood Ave., Buffalo, N. Y., chairman of the Clinic Committee, and Thomas R. Cullen, Oswego, N. Y., is chairman of the Exhibits Committee. The Executive Council will convene for the transaction of the business of the Society Wednesday, May 10, at 8 P.M.

The essayists are: I. Lester Furnas, Cleveland, Ohio; John Scholten and Harry E. Hanson of Cedar Rapids, Iowa; P. G. Puterbaugh, Chicago, Ill.; Walter Chappelle, Buffalo, N. Y.; Arthur B. Gabel, Philadelphia, Pa.; James E. Aiguier, Philadelphia, Pa., and Chalmers J. Lyons of Ann Arbor, Mich.

During the time of the meeting, sessions of the New York State Dental Hygienists' Association and the Dental Assistants' Association will be held.

Headquarters will be at the Hotel Syracuse, and reservations should be made direct with the hotel management.

For information with reference to the literary exercises, clinics, etc., apply to:

A. P. BURKHART, Secretary,  
57 E. Genesee St.,  
Auburn, N. Y.

## Chicago Centennial Dental Congress to Be Most Elaborate Meeting in History

A preview of the preliminary plans for the Chicago Centennial Dental Congress indicates clearly that the congress will be the most comprehensive and elaborate dental meeting ever staged. In the first instance it will combine the 75th annual session of the American Dental Association and the 69th annual meeting of the Chicago Dental Society. Sessions will be held in the Stevens Hotel August 7 to 12, 1933. Those who have attended both of these meetings in past years can readily appreciate that the combination will produce an unprecedented dental gathering. Add to this the fact that the dates coincide with the peak period of A Century of Progress Exposition (Chicago World's Fair) and the setting for the meeting becomes ideal.

Beginning June 1, 1933, the opening date of the World's Fair, and continuing until the closing date, October 31, 1933, the Congress in cooperation with the American Dental Association will present an elaborate popular dental exhibit in the Hall of Science on the Fair Grounds. It is anticipated that at least 50,000,000 persons will view this exhibit.

Registration of visitors will begin Saturday and continue throughout Sunday. In the evening the annual dinner and meeting of the American College of Dentists will be held.

*Monday.* The exhibitors' demonstrations will be the first order of the day in the Grand Ballroom. Later will be the first showing of the section on scientific exhibits, followed by historical addresses in all sections. The first general session will be held in the afternoon featured by the presidents' addresses. In the evening the various dental fraternities will hold their annual dinners.

*Tuesday.* At the first morning general session will be given a paper on operative dentistry, mouth hygiene and prevention. This session will be held concurrently with lecture demonstrations in all the sections. The second afternoon general session will feature a paper on full denture prosthesis. In addition there will be papers read in all the sections. At the evening general session there will be a guest speaker of national reputation whose topic will be nondental and of general interest to all visitors.

*Wednesday.* The second morning general session will be given over to a paper on partial dentures, crown and bridge, and ceramics. At the same time there will be general clinics in all the sections. In the afternoon there will be general sessions devoted to oral surgery, anesthesia and radiology, with papers read in all of the sections. The evening will be devoted to annual banquets of such organizations as the College Alumni Associations, Dental Hygienists, Dental Assistants, etc.

*Thursday.* A paper on orthodontia will headline the morning general session. Concurrently there will be lecture demonstrations. In all the sections the afternoon general session will be given over to oral pathology and therapeutics. The various sections will be occupied with the presentation of papers. The evening has been designated as Gala Night at the Exposition. The nature of the program for this evening has not yet been fully developed, but it is safe to say that the memory of it will linger long in the minds of those present.

*Friday.* The morning general session will be devoted to a consideration of the biologic sciences and research, with a paper on the subject. Concurrently there will be lecture demonstrations in all sections. The afternoon general session will be devoted to a paper on dental health. At the same time there will be papers in the various sections. The President's Ball, the crowning social event of the Congress, will be held in the evening.

*Saturday.* Special attention will be paid the manufacturers' exhibit in the morning. General clinics will be held in all sections, and also special clinics in the Grand Ballroom. At 12 noon the Congress closes.

This is a very sketchy outline of the program. There will be many recreational activities, such as golf, trapshooting, etc., which remain to be arranged. In future issues of this Journal we shall go more into detail about the meeting, the World's Fair and Chicago as a convention city.

In the meantime, it is our desire that every member of the American Dental Association consider that he has been personally invited to attend this history-making congress.

ARTHUR D. BLACK, President,  
STANLEY D. TYMAN, Secretary.

### Washington University Dental Alumni Association

The Washington University Dental Alumni Association will hold its annual meeting February 20, 21, 22, 1933.

This meeting will be unusual in that it is to consist of intensive postgraduate courses and special lectures, which are to be given by the members of the faculty of Washington University Dental School. No charge will be made for these courses.

Due to the attractive program a large attendance is expected.

The meeting will be held at the Washington University Dental School, 4559 Scott Avenue, St. Louis, Mo.

LEO M. SHANLEY, Secretary,  
4482 Washington Avenue,  
St. Louis, Mo.

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### American Society of Orthodontists

The thirty-second annual meeting of the American Society of Orthodontists will be held in Oklahoma City, Oklahoma, April 19, 20 and 21, 1933.

A cordial invitation is extended to all ethical practitioners of dentistry and orthodontia to attend this meeting.

WM. E. FLESHER, President,  
Medical Arts Bldg.,  
Oklahoma City, Okla.

CLAUDE R. WOOD, Secretary-Treasurer,  
Medical Arts Bldg.,  
Knoxville, Tenn.

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### Items of Interest

Dr. Julius C. Swartz announces the removal of his offices from the Southern Surety Building to Suite 914, Des Moines Building, Des Moines, Iowa. Practice limited to orthodontia.

Dr. Nathan G. Gaston announces the removal of his offices to Suite 309, Bernhardt Building, Monroe, La. Practice limited to orthodontia.

Dr. Wright J. Burley, formerly associated with the late Dr. Victor Lay in the practice of orthodontia, announces his succession to the practice. Offices at 40 North Street, Buffalo, N. Y.

Dr. Carl O. Engstrom announces the removal of his office from the Hagelstein Building to 604 California State Life Building, Sacramento, Calif. Practice limited to orthodontia.

Dr. Ralph Olds Leonard announces the extension of his practice to include orthodontia, Culver Military Academy, Culver, Indiana.



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